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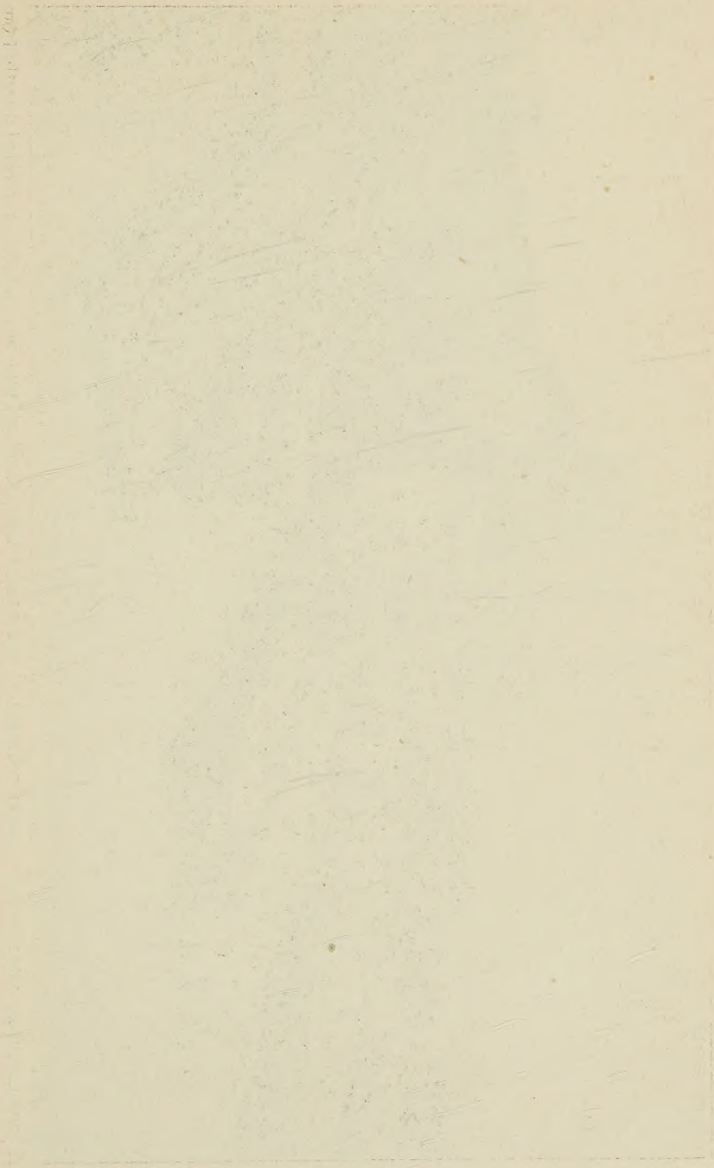

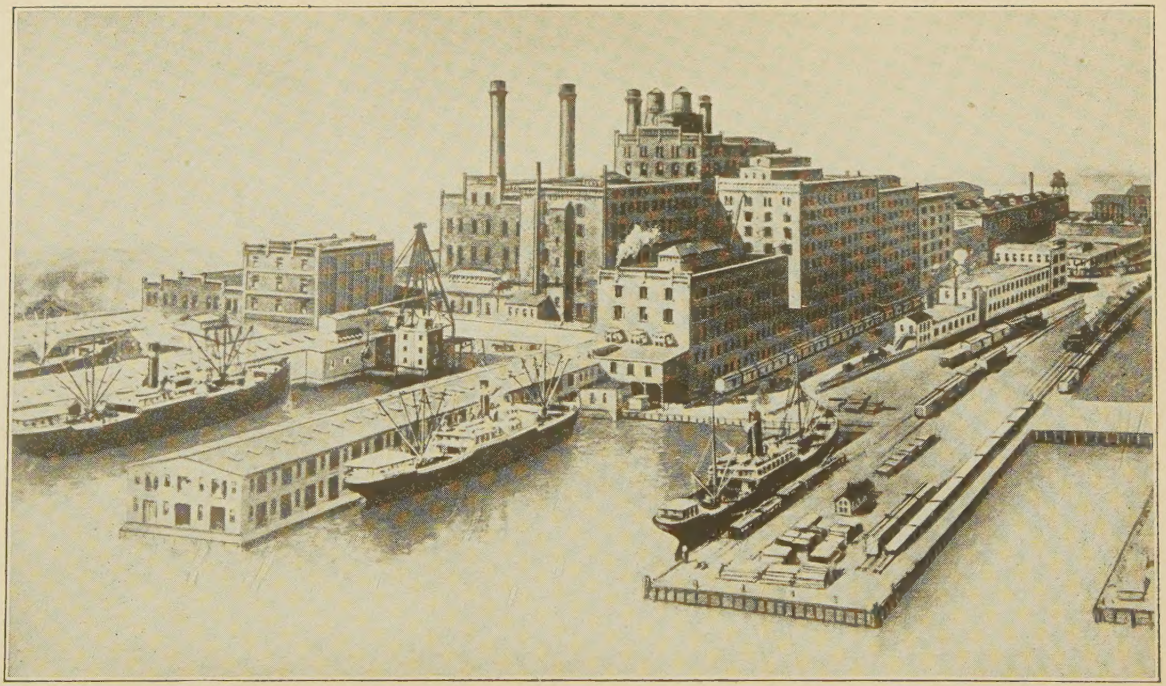

A manufacturing establishment (sugar refinery) at the water's edge, so placed that raw material is received directly from ocean-going vessels; the manufactured product may be loaded directly upon cars or ships, thus reducing the cost of handling to a minimum.

INDUSTRIAL GEOGRAPHY

PRODUCTION, MANUFACTURE, COMMERCE

BY

RAY HUGHES WHITBECK

Professor of Geography in the University of Wisconsin

AMERICAN BOOK COMPANY

NEW YORK CINCINNATI CHICAGO BOSTON ATLANTA

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Whitbeck's Industrial Geography

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PREFACE

This *Industrial Geography* covers the subject matter often included under the term Commercial Geography. The word *Industrial* is sometimes used in a restricted sense to apply only to manufacturing. It is not so employed here, but involves all of the major forms of industry, including agriculture, mining, manufacturing, trading, and transporting.

Relatively few statistics are given in the text. When employed at all, they are used mainly to suggest the orders of magnitude which are being dealt with, or for purposes of comparison. The author has avoided anything that resembles cataloguing of long lists of products, exports, imports, or non-essentials and minutiæ of any sort. Rather, it has been the aim to stress causes, principles, trends, and those facts which have real significance in the industrial life of a country or region. The "Why" is constantly at the front. Judgment and reason, as well as memory, are invoked. Yet, safe judgment and sound reasoning always rest upon a foundation of knowledge of pertinent facts.

Nearly all American and English texts in economic geography make both commodities and countries the units of treatment, and such is the procedure in this book. The United States is treated in considerable detail, and the commodities of commerce which it produces in a large way are discussed with some fullness in the various chapters devoted to this country. Other commodities are given their major treatment in connection with those countries in which they are respectively most important, as, for example, wild rubber and coffee in Brazil, and tea, rice, silk, and plantation rubber in the Far East. The second part of the book, consisting of twenty chapters, makes *countries*

George S Corfield

or groups of countries the units of study — Canada, France, Germany, Japan, etc. In the treatment of countries a persistent effort is made to bring out in bold relief the facts and principles which give to a country its individuality, which make it the sort of economic entity that it is, for countries as well as people have character and individuality.

Again, the author has tried from first to last to make a teachable book; simple in language and interesting in content. Topic paragraphs are purposely short; diagrams, distribution maps, and other graphic aids are abundant, and summaries and exercises conclude nearly every chapter. The exercises are designed both to review and to summarize important points discussed in the text, and to stimulate thinking along lines related to the text matter but not actually discussed there.

Illustrations have been gathered from many sources, especially from publications of government departments, and notably those prepared under the direction of Dr. O. E. Baker of the Bureau of Agricultural Economics of the Department of Agriculture.

A list of carefully selected and classified reference books is given on pages 579–582. It is hoped that many of these books or similar ones may be available for pupils in preparing topics and special reports and in doing supplementary reading. Moreover, the maps in the textbook, with wall maps for class use, should be used constantly. There can be no effective teaching of geography without persistent use of maps upon which to locate every place that is worth study.

The author is indebted for assistance, suggestions, and illustrative material to many people; but especially to his colleague, Professor V. C. Finch, for a reading of the complete manuscript, and to Mrs. Selma Schubring for valuable suggestions and for assistance in proof reading.

R. H. Whitbeck.

University of Wisconsin, Madison.

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INDUSTRIAL GEOGRAPHY

CHAPTER I

MODERN COMMERCE AND INDUSTRY

Robinson Crusoe's Mode of Life

When the ship in which Robinson Crusoe sailed was wrecked and he was cast upon the island alone, he saved a few tools, a gun and some ammunition, a little grain, and a few other things. Upon this island he lived for many years without any contact with his fellow men (until Friday came) — wholly dependent upon himself. With quaint simplicity Defoe, the author, makes Crusoe tell the details of the story of his own life on the island. It is an absorbing story. Here was a man who, by a turn of fortune, found himself under the necessity of doing absolutely everything for himself. To raise food he had to dig up the ground with a wooden spade which with great difficulty he had made, drag a heavy bough over the ground to pulverize the soil, cut the grain with a crude sickle which he had laboriously fashioned from a sword, rub the grain from the straw with his bare hands, pound it into flour in a hollowed-out log, and bake his bread in an earthen oven which he had managed to construct.

But the story is more vivid as Crusoe tells it in his own straightforward language. The following are scattered parts brought together from many pages of the book:

"I walked about the shore almost all day, to find out a place to fix my habitation. Towards night I fixed upon a proper place, under a rock. From the 26th to 30th, I worked very hard in carrying all my goods to my new habitation."

"The 7th, 8th, 9th, 10th, and part of the 12th (for the 11th was Sunday) I took wholly up to make me a chair."

"The next thing was a shovel, or spade. This was so absolutely necessary, that I could do nothing effectually without it; but what kind of one to make I knew not. In searching the woods, I found a tree which, in the Brazils, they call the iron tree for its exceeding hardness. With great labor, and almost spoiling my axe, I cut a piece, and brought it home, and worked it by little and little into the form of a shovel or spade."

FIG. 1. Robinson Crusoe made his own clothes, cap, and umbrella.

"I still wanted a basket, or wheelbarrow. A basket I could not make, having no twigs that would bend to make wicker-ware — at least, none yet found. As to a wheelbarrow, I fancied I could make all but the wheel. That I had no notion of. So I gave it over, and for carrying away the earth which I dug out of the cave, I made me a thing like a hod, which laborers carry mortar in."

"I also was at a great loss for candles. So, as soon as it was dark, which was generally by seven o'clock, I was obliged to go to bed. The only remedy I had was, that when I killed a goat I saved the tallow, and with a little dish made of clay, which I baked in the sun, to which I added a wick of oakum, I made me a lamp."

"I saved the skins of all the creatures that I killed. . . The first thing I made of these was a cap for my head, with the hair on the outside, to shoot off the rain; and I made me a suit of clothes wholly of those skins — that is to say, a waistcoat and breeches. I spent a great deal of time and pains to make an umbrella. I spoiled two or three before I contrived one to my mind."

"I was full two and forty days making a board for a long shelf, which I wanted in my cave."

"I had no plough to turn up the earth. This I conquered by making me a wooden spade; but this did my work in a wooden manner. When the corn [grain] was sown, I had no harrow, but was forced to go over it myself and drag a great heavy bough of a tree to scratch it. When it was growing, and grown, how many things I wanted to fence it, reap it, cure and carry it home, thresh it, part it from the chaff, and save it! Then I wanted a mill to grind it, sieves to dress it, yeast and salt to make it into bread, and an oven to bake it."

"I had long studied means to make some earthen vessels which, indeed, I wanted sorely. Considering the heat of the climate, I did not doubt but if I could find any clay, I might make some pots that might, being dried by the sun, be hard enough and strong enough to bear handling."

"My next concern was to get me a stone mortar to stamp or beat some corn in. To supply this want, I was at a great loss. I spent many a day searching for a great stone to cut hollow, and make fit for a mortar. So, after a great deal of time lost in searching for a stone, I resolved to look out for a great block of hard wood; and getting one as big as I had strength to stir, I rounded it, and formed the outside with my axe and hatchet, and then, with the help of fire and infinite labor, made a hollow place in it."

"The baking part was the next thing to be considered. For an oven I made some earthen vessels. These I burned in the fire and laid them by: and when I wanted to bake, I made a great fire upon my hearth, which I had paved with square tiles of my own baking and burning also. Thus I baked my barley-loaves."

Modern Division of Labor

Robinson Crusoe, living thus alone, constructing most of his own tools and utensils, producing or securing all the food that he ate, and making the clothes that he wore, is an example of human life *without division of labor.* Crusoe himself did all the kinds of work necessary for his own existence. He was hunter, farmer, herdsman, miller, baker, cook, tanner, tailor, potter, smith, porter, carpenter, and builder. He was kept busy a large part of every day just providing for his own simple needs. He could not become expert in any one occupation, because he had to engage in so many occupations. Having learned, for example, how to make one umbrella from skins, Crusoe could have made

a second and third more quickly; and if he made nothing but umbrellas he would soon have become skillful, and would gradually have devised quicker and better methods of doing this particular kind of work.

In a modern community one man is a carpenter, another a smith, another a tailor, and another a physician, a merchant, a teacher, or a banker. The different kinds of work to be done are taken up by different men, and each becomes skilled in his own line and can do his work rapidly and efficiently; thus the total amount accomplished by the community is far greater than it could be if each man did all kinds of work.

Providing a Modern Dinner. — In a country like the United States the division of labor is carried to an extent that we scarcely appreciate. When Robinson Crusoe wanted a dinner he had to secure and prepare every item in the meal. He himself brought things together, prepared them for cooking, cooked them, and served them. How different the case of a present-day dinner served in a modern city home! It consists, let us say, of

grapefruit	salad
roast beef	rice pudding
potatoes	coffee
bread and butter	cream and sugar

How were the different items of this dinner produced, brought together, and finally, in an hour of time, prepared and placed before us? The housewife or maid went to the telephone, called up the grocer, gave her order, and in a short time a delivery boy laid down in her kitchen the articles which had been ordered. It was a simple, easy, inexpensive procedure. But the grapefruit had been grown in Florida by a fruit grower who has several hundred trees and makes a special business of raising grapefruit. A railroad company, whose business is to transport goods, transported a carload of grapefruit to the freight station, say, in Chicago. Here special freight handlers unloaded the carload of fruit; a truckman whose business is hauling freight delivered the cases of fruit to a wholesale dealer who makes a business of buying all kinds of fruit in quantity and supplying it to retail dealers, who in turn supply it to their customers. Thus the grapefruit which you unthinkingly eat represents service by a fruit grower and his laborers in Florida, one or more railway companies, several truckmen, a wholesale dealer or two, a retail dealer and his clerks, a delivery boy, and perhaps

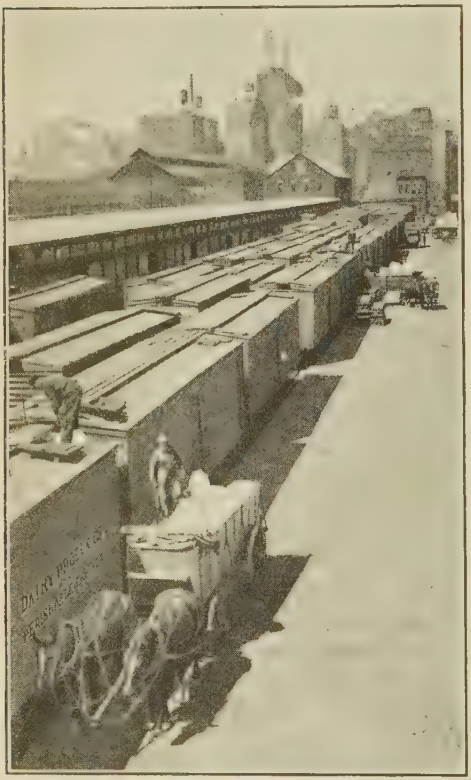
several other persons or corporations. One or more brokers may also have had a part in the chain of transactions; and yet the grapefruit is placed before you at a cost, maybe, of 10 cents.

The roast beef may be traced back to a cattle ranch in Wyoming, where a ranchman makes a business of raising cattle. The steer, one of a train-load, was transported by a railroad company to a farm in the Corn Belt where a farmer fattened a hundred or more such cattle for the Chicago market. Another railroad company conveyed the fattened cattle to the Chicago stockyards, where a commission broker sold them to the buyer employed by a meat-packing company. In the packing plant over a hundred different men performed their various parts in dressing the meat and getting it ready for shipment. It was sent in refrigerator cars to the branch houses in various cities. It was delivered to the retail meat markets, cut up by the butchers, and your order was delivered to your house, where a cook completed the long chain of services. From one hundred to two hundred people had placed themselves at your service in order that you might have your slice of beef.

A dozen other persons and agencies coöperated in placing the potato on your plate at a cost of 2 or 3 cents. Perhaps thirty or forty more persons were employed in seeing that you had bread and butter. The pineapple in your salad may have come from Hawaii, the nuts from California; the salad dressing, made of a half-dozen ingredients, came from as many different parts of the world; the rice in the pudding came perhaps from Louisiana, the raisins from California, and the spice from the East Indies. The coffee represents the work of the planter in Brazil, the pickers, cleaners, porters, driers, sackers, carters, railroad companies, dock men, exporting brokers, steamship company, stevedores, importing brokers, truckmen, roasters, and retailers, and is placed before you at the cost of a few cents. The sugar, grown perhaps in Cuba, passed through even more processes than the coffee before it reached you.

The Organization of Modern Business. — Even an ordinary meal usually involves the services of several hundred different persons and agencies; every one doing some one particular form of work, but doing it efficiently, doing it for many people at once, and thus being able to do it cheaply. This is an illustration of modern division of labor. The practice has grown up gradually, and work is being divided into more and more forms as the volume of commerce and industry increases. It is evident that

the success of this extreme division of labor is dependent upon *complete organization of business*, and upon *rapid and cheap transportation*. Without these factors modern business could not go on. The great number and perfection of the agencies for carrying on modern business could not exist if there were not *a large volume of business* to be done; and the larger the volume of business to be done, the more the work will be divided and subdivided among many people, each doing his own special part.



© *Ewing Galloway*

FIG. 2. Placing ice in refrigerator cars in a Chicago freight yard. Such cars make possible the shipping of meat and other perishable foods.

So accustomed are we to the ways of modern business that we seldom pause to think how well organized they are, and how smoothly the whole vast system of the world's commerce operates. We have the telephone, the telegraph, the radio, the cable, regular mail delivery, special delivery, registered mail, the parcel post, the express, the mail car, the refrigerator car (Fig. 2), tank car, milk car, taxicab, autotruck, lighter, ferryboat, barge, towboat, fruit steamer, tank steamer, passenger liner, freighter, and other special conveyances and

means of communication, all of which work together and work smoothly, rapidly, and cheaply. We have at our call endless kinds of service — men or companies whose sole business is to serve the public; bankers, brokers, attorneys, insurance companies, electricians, engineers, news-collecting agencies, and many others. An ordinary business man in the course of the day may make use of perhaps a hundred different kinds of service provided by governmental or private agencies. All of these are aspects of the greatly diversified division of labor.

The Geographical Division of Labor. — A large part of the division of labor has come about merely as a means of securing better service and greater economy; but there is another form known as the *geographical division of labor* which has a somewhat different basis. For example, coffee is produced in Brazil, sugar in Cuba, rice in Louisiana, and beef cattle in Wyoming, because in these particular regions the climate and perhaps other geographical factors are suited to these special lines of production. The half-fattened beef cattle are brought from Wyoming to some state like Iowa for finishing, because there the climate is especially favorable for the growing of corn, one of the best foods for the fattening of live stock. By dividing the work of food production, each geographical region produces the things — coffee, sugar, pineapples, raisins, wheat, or beef — for which it is especially suited, and then ships its products to regions where they are wanted; and in turn buys from these regions things that its people desire but do not produce.

Both aspects of the division of labor have reached high development only in those parts of the world where *the civilization of the people*, *the stability of government*, and *the accumulation of capital* have multiplied people's wants and have made it possible to provide the transportation facilities, banking facilities, and other facilities for carrying out the work.

The whole modern structure of industry and commerce is the working out on a vast scale of the principle of the division of labor, — each person doing some part of the world's work; each region supplying that which it is best fitted to supply; the freest

possible movement of goods from place to place being provided for.

If all the countries of the world had the same climate, the same kinds of soil, the same topography, the same minerals, the same fauna and flora, and the same sort of people with the same aptitudes and skills, there would be little occasion for international commerce. But such is not the case. Indeed, the actual situation is quite the opposite, and because it is the opposite an enormous volume of international commerce has grown up; and it increases from century to century with astonishing rapidity.

Fundamental Reasons for Commerce

Man's Ever-Increasing Wants. — All industries and commerce arise because people have wants. But the wants of civilized people constantly increase. As people gain more knowledge of what may be had, they devise new ways of getting more goods, — better clothes, houses, and vehicles; more books and furniture, and more luxuries generally. There appear to be absolutely no limits to this increase of wants, and hence no limits to the expansion of commerce throughout the future. A thousand years hence the volume of the world's commerce will probably make that of to-day look trifling by comparison.

Increase of Knowledge the Chief Cause of Increased Wants. — The North-Greenland Eskimo wants few things, mainly because he knows nothing of the existence of most things. He does not long for an automobile, a fountain pen, or an oil painting, principally because he does not know that there are such things, and secondly because they would not satisfy any of his particular wants.

Such wants as food, clothing, shelter, tools, and utensils are universal among even primitive men; and the number of our wants increases with civilization. The attractive show windows of modern stores, and the display advertising in our magazines, are ingenious methods of making us want more things. The more we go about to well-furnished homes, the more we mingle

with well-dressed people, and the more we travel, the more numerous our wants become.

Supplying Wants Gives Rise to Industry and Commerce. — As people come to know of pleasure-yielding articles that are obtainable in various places, they desire them, and are willing to pay the necessary cost of obtaining them. We like oranges,

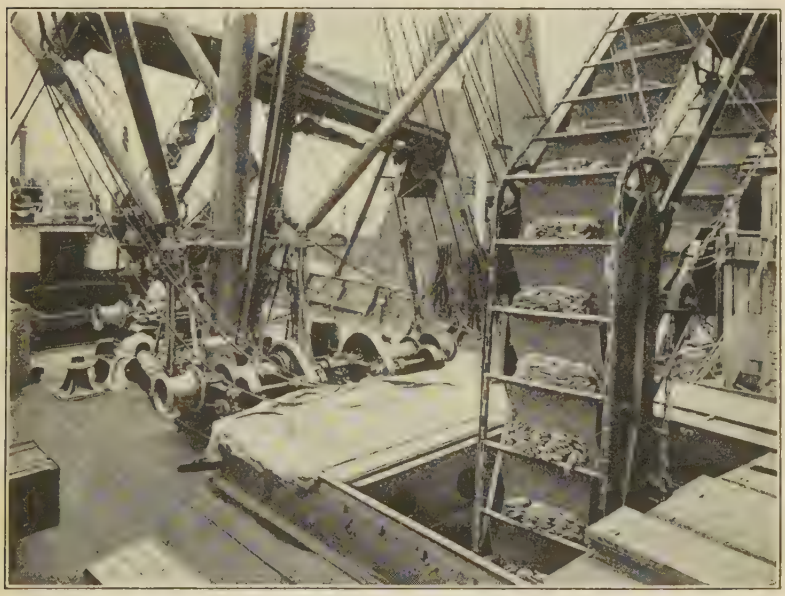


FIG. 3. Bananas, imported from Central America and the West Indies, are rapidly unloaded by machinery at New Orleans and other ports.

bananas (Fig. 3), coffee, and sugar; we prize Chinese silk, Turkish rugs, French porcelains, Irish linen, and Swiss watches; and we are willing to work in order to acquire them. We devote ourselves to our own particular work in order that we may obtain the money with which to buy the products of other people's work; and other people are doing the same. Thus, industries are increased and supported. The more we work and produce and sell, the more we can buy. The more people gain knowl-

edge, and increase their wants, and work to supply them, the more industry and commerce thrive.

Commerce Depends upon Transportation. — The cheapening of goods is the greatest means of increasing their use. The vast majority of the people of the world cannot buy articles that are expensive. Goods can be sold in great quantities only if they are sold cheap. The cost of transporting products may so add to their cost that most people cannot afford to buy them. As already suggested, one of the fundamental needs of commerce, if it is to be increased and industries are to be stimulated, is rapid, cheap transportation. Some parts of the world, such as the United States and western Europe, now have this, and their commerce has risen by leaps and bounds. But other parts, like interior Africa and interior Asia, have inadequate means of transportation and their commerce is still small.

Causes of the Flow of Commerce. — We speak of the *flow* of commerce, and of *currents* of commerce, and of the *volume* of commerce, as if commerce were some sort of fluid, flowing like a river. The comparison is a good one, and we may use it to advantage. Water flows from higher to lower levels; air flows from places of higher pressure to places of lower pressure; and electric currents flow from higher to lower potentials. In short, currents of all kinds flow (1) from places of abundance to places of scarcity, or (2) from places of supply to places of demand, or (3) from places of production to places of consumption. All of these expressions convey much the same idea; all imply that because of some sort of difference of economic level, products flow from one place to another. These are the currents of commerce, the movement of products from country to city, from warm climates to cool, from advanced countries to backward countries, and so on. These principles may be summarized as follows: *Commerce is the movement or flow of goods from places where there is a surplus to places where there is a deficiency.* This difference in trade level may arise from —

(1) *Differences in climate*, giving rise to difference in products. Cane sugar, cotton, coffee, and cacao grow only in a warm cli-

mate; while wheat, beef, butter, and wool are produced mainly in a temperate climate.

(2) *Differences in soil and topography.* Coffee grows best on well-drained slopes in soil that is rich in iron. Wheat is most successfully raised on broad, level plains of moderate rainfall; and potatoes grow best in light, loam soils.

(3) *Differences in distance from markets,* that is, from the places where the products are to be used. For example, silk, wool, and cotton may be raised thousands of miles away, but milk and some fresh vegetables cannot be profitably shipped long distances, and are usually produced near the places where they are to be used.

(4) *Differences in natural resources.* Gold, copper, petroleum, and the other minerals are found in relatively few localities, and must be shipped to places where they are wanted but do not exist.

(5) *Differences in the degree or kind of civilization of peoples.* Highly industrialized peoples produce a surplus of manufactured goods which are sold to those who are less advanced in modern industry.

(6) *Differences in skill, aptitude, education, and cost of labor,* which cause different peoples to specialize in the production of certain articles. The silk, tea, and rubber of the Orient depend upon cheap labor. Germany, whose people long excelled in chemistry, formerly supplied most of the world with dyes. Denmark excels in the manufacture of butter, and the United States in the manufacture of machinery.

All of the above represent those differences among the peoples and regions of the earth which lead to differences in needs and wants and which set in motion the currents of commerce.

Reasons for the Growth of Production and Commerce

Growth of the World's Population. — In the century between the end of the Napoleonic wars in 1815 and the outbreak of the World War in 1914 the population of the earth increased from

about 700,000,000 to 1,600,000,000, thus more than doubling, in one hundred years, the number attained in all the preceding thousands of years. Clearly, some new influences must have been operating that did not so effectively operate before. Population, of course, can increase only as fast as the food supply can be increased. During all the centuries of man's existence down to a little over a century ago, he provided for his needs (1) by hunting, fishing, and the gathering of such nature-produced foods as he could find; and later (2) by raising domesticated animals and carrying on agriculture by hand labor; and (3) by making by hand various articles that could be exchanged for food and other necessities. But the large amount of work required to produce crops by hand labor greatly limits the amount of food that can be produced in this way. Moreover, long wars took men from the field and workshop, kept them engaged in destruction instead of production, caused the premature death of many, and thus checked the increase of population. To wars were added the frequent famines and pestilences which now in the more advanced countries have nearly ceased. Medical science has reduced the death rate and increased the expectation of life. Recent wars have been terribly destructive while they lasted, but they have been relatively short; and in the longer periods of peace the use of modern machinery in the production of food and other goods has made possible a rapid increase of population.

Increase in the Production of Food and Other Goods. — The great increase in man's ability to produce all kinds of goods is due largely to the substitution of machines for human labor (Figs. 4, 5). With modern farm machinery, American farmers, though now actually declining in numbers, are producing more food than ever before. At the present time the production of food per person engaged in agriculture is three or four times as great as it was eighty years ago, and the work is done more easily. A hundred million people in India, who live by cultivating the soil, produce less food than ten million do in the United States. By the use of machinery such countries as the United

FIG. 4. Plowing in Mexico. These plows are crude wooden implements that do scarcely more than scratch the surface of the ground.

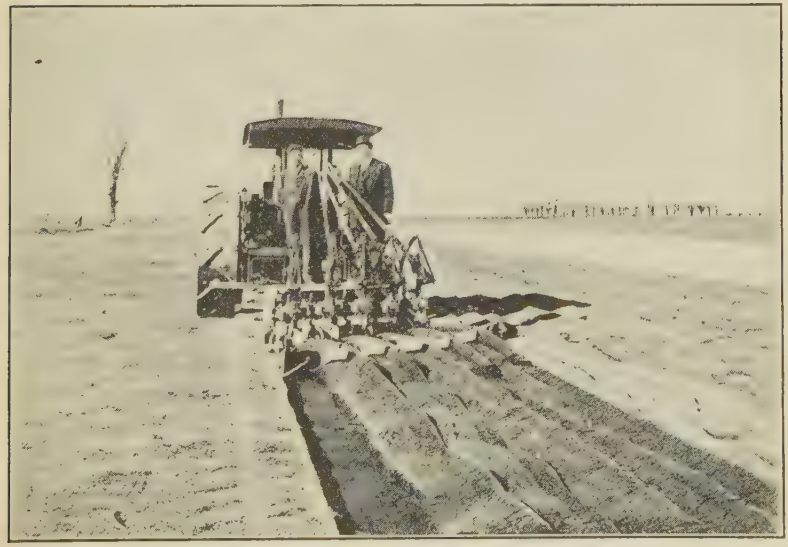


FIG 5. Plowing in the United States. This tractor draws a gang plow turning five furrows.

States, Canada, Australia, and Argentina are able to feed their own people and millions in other lands besides. But the increase in crop production by the use of machinery — great as it is — falls far short of the increase in the production of manufactured goods. In a modern shoe factory, for example, the workers turn out ten to twenty times as many shoes as they could make by hand; and a single workman tending a group of power looms weaves a hundred times as many yards of cloth as he could weave on one of the old-time hand looms. Even in 1850 the average yearly output of manufactured goods per workman in the United States was only $1000, while in 1920 it was over $5000. In the making of such articles as nails, screws, and bolts, machines have multiplied man's efficiency a thousand times or more.

An equally wonderful change has come in the efficiency of transportation methods. A freight locomotive hauls fifty cars carrying 1000 tons of freight twenty miles in an hour (20,000 ton-miles an hour). Even on a good road, to do an equal amount of work would require under average conditions 4000 teams of horses, and nearly as many men and farm wagons.

Just how much the total production of goods increased between 1814 and 1914 is not definitely known, but some idea of the magnitude of the increase may be inferred from the following facts:

Between 1814 and 1914
- the population of the earth was multiplied by 2;
- the production of cotton was multiplied by 20;
- international commerce was multiplied by 25;
- the value of manufactured goods was multiplied by at least 50;
- the production of coal and iron was multiplied by about 100.

It is evident that in that century the world made greater progress in its methods of production than it had made in all the thousands of years before.

Factors that have Caused the Great Increase in the Production of Goods

Coal and Steam. — It has already been pointed out that the past century witnessed a marvelous expansion in the use of machinery. The largest single factor in bringing about this expansion was the invention and perfecting of the steam engine, by means of which the greater part of the manufacturing and the greater part of the world's transportation are now accomplished. Steam engines can use wood, coal, petroleum, or other fuel, but they have depended mainly upon coal, and no other fuel is sufficiently abundant to take its place. Oil is a preferable fuel but it is far too limited in quantity to replace coal. Water power will be of increasing use in industry, but it can take the place of coal only to a moderate extent. For a long time to come our factories, railroads, and steamships must depend mainly upon the energy obtained from coal.

The Use of Metals, Especially Iron. — During the past century scientific investigation has yielded a great increase in our knowledge of metals and their properties and uses. Of all the metals iron is the most important, and rich deposits of iron ore are found in many parts of the world. By modern methods (the Bessemer process and the open-hearth process) iron may be rapidly and cheaply converted into steel, which is stronger, tougher, more elastic, and for almost all purposes better than iron. So highly perfected are the methods of producing steel that steel machinery of almost infinite variety has been designed and is being manufactured at a cost that places it within the reach of practically everybody who needs it. Thus the science of metallurgy — and especially the metallurgy of iron and steel — is a second cause of the great increase of industry and commerce.

Cheap and Efficient Transportation. — Modern methods of transportation — rapid, cheap, convenient, and efficient — are the outgrowth of the coal-driven steam engine made of steel, and of steel ships, railroads, cars, and bridges. The railroad and the steamship for transporting goods in great quantities are

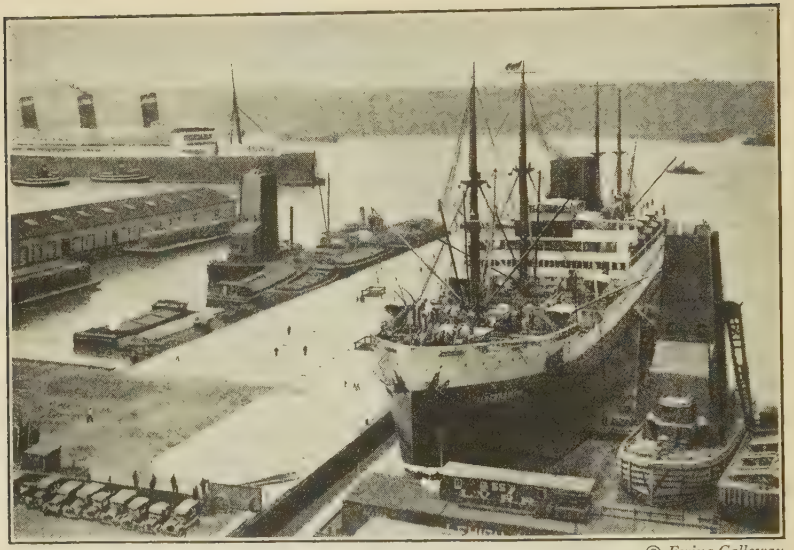


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FIG. 6. Small section of the port of New York. At the left is the largest American liner, the *Leviathan*. At the right a floating elevator is transferring wheat from two lighters to an ocean steamship. It costs less to ship wheat 3000 miles from New York to Liverpool than 400 miles by rail from Buffalo to New York.

far more efficient than any other means. So closely are railroads related to the prosperity and general strength of a nation that its greatness may almost be gauged by its railroad development. It is noticeable that the dominant nations of the world are those that use the largest quantities of coal and iron, and have the best railroad systems. The overseas commerce of a nation is not dependent upon that nation's owning its own merchant ships, for the sea is a free highway, and the ships of all nations may enter practically any port, and may carry the foreign commerce of any country. It is, however, a commercial advantage to a country to have a merchant fleet of its own, and to be able to carry a considerable part of its own commerce. For many years prior to the World War, from 80 to 90 per cent of the ocean commerce of the United States was carried by

foreign ships, especially British, and even with the great merchant fleet that we had in the years around 1923, we carried less than half our ocean commerce in American ships.

Rapid Communication. — The many facilities which modern business has at its command have grown up together, each aiding all the others. The rapid mail service with its regular and special delivery of mail permits a speeding up of business transactions which was wholly impossible a century ago. Train service is far more efficient because of the use of the telegraph and telephone in managing traffic, and steamship movements are aided day and night by cable and radio service. There are scores of agencies engaged in the rapid collecting and distributing of information throughout the civilized world. These agencies collect information of almost every useful type and transmit it by cable, radio, or telegraph to the world's commercial centers, whence it is distributed by the daily press and by other means.

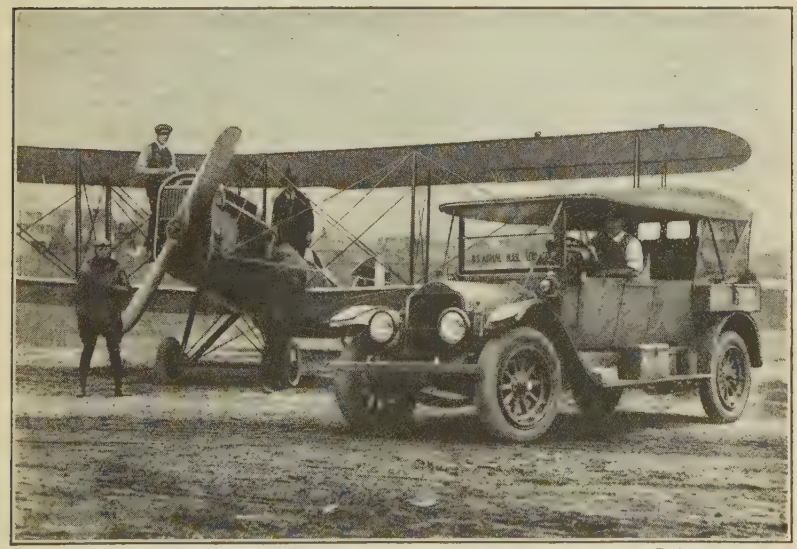

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FIG. 7. Postal airplane at landing field, Cleveland, Ohio; and motor car that conveys the mail bags to and from the post office.

NORTH POLE
ARCTIC OCEAN
ATLANTIC OCEAN
PACIFIC
GREENLAND
(To Denmark)
ICELAND
Reykjavik
Denmark Strait
Cape Farewell
Davis Strait
Baffin Bay
Hudson Bay
Hudson Strait
Southampton I.
Foxe Basin
Foxe Channel
Melville Pen.
Boothia Pen.
North Magnetic Pole
Arctic Circle
Great Slave Lake
Great Bear Lake
Lake Athabasca
Lake Winnipeg
Lake of the Woods
Lake Superior
Lake Michigan
Lake Huron
Lake Erie
Lake Ontario
Lake Nipigon
Lake Abitibi
Lake Timiskaming
Lake St. John
Lake Mistassini
Labrador
Ungava
Quebec
Montreal
Ottawa
Toronto
Kingston
Hamilton
Niagara Falls
Buffalo
Rochester
Syracuse
Albany
Boston
Portland
Mt. Washington
Mt. Katahdin
Mt. Desert I.
Gaspé
Anticosti I.
Prince Edward I.
Cape Breton I.
Sydney
Halifax
St. John
Bay of Fundy
Gulf of St. Lawrence
Gulf of Mexico
Florida
Cuba
Bahama Is.
Jamaica
Yucatan
Mexico
Mexico City
Vera Cruz
Tampico
Rio Grande
Texas
Galveston
Houston
New Orleans
Mobile
Atlanta
Charleston
Savannah
Jacksonville
Tallahassee
Tampa
Key West
Nashville
Memphis
Louisville
Cincinnati
Columbus
Pittsburg
Cleveland
Detroit
Chicago
Milwaukee
Minneapolis
St. Paul
Duluth
Fargo
Bismarck
Pierre
Omaha
Kansas City
St. Louis
Indianapolis
Dakota
Nebraska
Kansas
Oklahoma
Indian Territory
Arkansas
Missouri
Iowa
Illinois
Indiana
Ohio
Kentucky
Tennessee
Mississippi
Alabama
Georgia
South Carolina
North Carolina
Virginia
West Virginia
Pennsylvania
New York
Vermont
New Hampshire
Maine
Connecticut
Rhode Island
Massachusetts
New Jersey
Delaware
Maryland
Wyoming
Colorado
New Mexico
Arizona
Utah
Nevada
California
Oregon
Washington
Idaho
Montana
Alaska
Yukon
Mackenzie
Athabasca
Saskatchewan
Assiniboia
Alberta
Manitoba
Ontario
Quebec
New Brunswick
Nova Scotia
Prince Edward I.
Newfoundland
Labrador
Vancouver I.
Queen Charlotte Is.
Prince Rupert
Victoria
Vancouver
New Westminster
Calgary
Edmonton
Regina
Winnipeg
Port Arthur
Fort William
Sault Ste. Marie
Sudbury
North Bay
Ottawa
Montreal
Quebec

Fig. 8
NORTH AMERICA
SCALE OF MILES
0 200 400 600 800 1000
ELEVATIONS IN FEET
Over 5000
2000 to 5000
1000 to 2000
0 to 1000
Land below Sea Level
DEPTH IN FATHOMS
0 to 100
100 to 1000
1000 to 2000
Over 2000
Principal Railroads
Principal Steamship Routes
Submarine Cables
COPYR GHT, BY AMERICAN BOOK COMPANY
UNITED STATES
MEXICO
CUBA
WEST INDIES
SOUTH AMERICA
CENTRAL AMERICA
Gulf of Mexico
Caribbean Sea
New Orleans
Galveston
Chihuahua
El Paso
Tampico
Mexico
Vera Cruz
Acapulco
Salina Cruz
Havana
Key West
Belize
Tenoicigalpa
Managua
San Jose
Colon
Caracas
Bogota
Kansas City
St. Louis
Denver
Los Angeles
Atlanta
Savannah
Charleston
Washington
Pittsburgh
Cincinnati
Louisville
Jamaica
Santiago de Cuba
Santo Domingo
San Juan
Bermuda Islands
Bahama Islands
Tropic of Cancer
Panama Canal
Isthmus of Panama
Isthmus of Tehuantepec
Gulf of Tehuantepec
Gulf of California
Lower California
Yucatan Channel
Florida Strait
Gulf Stream
Mississippi R.
Rio Grande
Sierra Madre
Appalachian Mts.
Lesser Antilles
Trinidad
Orinoco R.
Magdalena R.
Pacific Ocean
Atlantic Ocean
120° 110° Longitude 100° West from 90° Greenwich 80° 70°
30° 20° 10° 0°
C. L. POATES CO., N.Y.

For example, the dealer in wheat on the Chicago Board of Trade may know every day the progress of the wheat crop in Rumania, Australia, Argentina, Canada, or any other important wheat-growing country. The information is collected, transmitted, and distributed by agencies that make such service their business. Steamship movements the world over are constantly reported by cable and wireless. Ships often sail from port without knowing their destination, and their movements are directed by wireless from the home port. Cars of fruit, eggs, vegetables, and other products are frequently shipped without being consigned to any particular person or place, and while en route are directed by telegraph to the particular city which on that day offers a good market for them. Without the aid of rapid mail service and of the telephone, telegraph, cable, and radio, the enormous volume of business that is transacted daily would be wholly impossible. In parts of the world where such facilities are poorly developed, business is slow and uncertain.

The Importance of Strong and Enlightened Government. — It is difficult to induce people to invest money in such countries as Venezuela, the Central American republics, or Soviet Russia, for the governments of these countries are not trusted; property at times is unsafe, and justice in the courts is uncertain. Under such conditions capitalists are hesitant, and progress is necessarily retarded. For example, however essential a new railroad may be to the commercial interests of a country, the money to build it will be difficult to secure if the government is weak or corrupt. Enlightened governments enact and enforce beneficial laws, maintain justice, protect life and property, provide for the education of the people, and maintain agencies that work for the public good. They maintain in all parts of the world consuls and commercial attachés who seek to build up the commerce of their respective countries. They support investigations in agriculture, forestry, mining, fisheries, water power, and scores of other fields, -- all of which aid in building up the industries of the country. In short, enlightened government is absolutely essential to any considerable economic progress.

The Importance of Public Education and the Service of Science. — Another reason why certain countries make more rapid progress than others is that the former countries devote public funds generously to the cause of education. All their people have some training and large numbers become expert in railway engineering, mining engineering, chemistry, finance, business management, and scores of other specialties. By the systematic training given in schools and colleges and by the opportunities for practical training in these occupations themselves, the country is provided with trained men who are capable of doing big things, and doing them effectively. Intelligent leadership and abundant skilled labor are provided, and the country's resources are developed and its industries built up.

Moreover, these countries have hundreds of experimental laboratories and stations where scientific investigations are constantly in progress — investigations in metallurgy, chemistry, electricity, agriculture, animal breeding, plant breeding, and industrial processes. Thus new ideas and better methods are constantly being brought to light, and science ministers to the economic growth of the country. The United States and Germany are outstanding examples of such countries, while some of the Latin American countries illustrate the backwardness which comes from the lack of these advantages.

The Importance of Capital and of Labor. — Large undertakings, such as the building of railroads, the establishment of steamship lines, of extensive telephone, telegraph, and cable systems, of pipe lines, of large industrial and mining plants and many others, call for great sums of money, and without such capital these costly undertakings cannot be carried out. One of the chief hindrances to the progress of South America and Asia is the lack of money and credit. In the United States, Great Britain, France, and other wealthy countries, the great sums of money necessary for doing big things are obtainable.

A large part of the money invested in large undertakings goes to pay for labor, and even if money is obtainable, the securing of competent labor is sometimes difficult. Tens of thousands

of laborers had to be recruited in Spain and the West Indies for building the Panama Canal. Thousands of Chinese were brought in to aid in building our first transcontinental railroads. Gold and diamond mining in South Africa call for an army of laborers, most of whom are blacks induced to come to the mines to work. The success of rubber plantations in the Orient and their general failure in the American tropics are in large measure due to the abundance of cheap and intelligent labor in the Far East, and its absence in tropical America. In almost all new countries, such as South America, South Africa, Australia, Canada, and the farming regions of the United States, there is a shortage of labor, and the securing of adequate labor is one of the big problems in the development of many of these new countries. The remarkable progress of the United States has been due in part to the stream of European immigrants that has steadily poured into the country, attracted by the exceptional opportunities of all kinds which this country offered and still offers.

Summary

This chapter shows that the production of goods has increased much faster than the population of the earth, due in large part to

(*a*) the substitution of power-driven machinery for hand labor;

(*b*) the improvement and extension of means of transportation;

(*c*) the introduction of rapid communication;

(*d*) the increasing proportion of human effort devoted to peaceful pursuits;

(*e*) the active assistance given to industry and commerce by enlightened governments;

(*f*) the benefits of education and science;

(*g*) the increasing amount of capital which is available for carrying out costly but highly efficient enterprises;

(*h*) the more effective use of labor under skillful management.

There are, of course, still other factors.

Exercise

1. Do you know of any part of the world where people live somewhat as Robinson Crusoe did? State where and explain why you name these people.

2. Explain why more can be accomplished under the system of division of labor than otherwise.

3. Make a list of the articles which made up your own dinner; tell if you can where they may have come from, and point out what classes of people or groups of people assisted in providing them.

4. Why is the division of labor in its most highly developed form possible only in populous regions or countries?

5. Why are business organizations and efficient transportation necessary in carrying out modern division of labor?

6. Explain the meaning of "geographical division of labor."

7. How do education, travel, wealth, and advertising stimulate commerce?

8. Why might we expect that commerce would flow along north and south lines more than along east and west lines?

9. Why does it not?

10. State some of the important causes of the great increase in the production of goods in the last half century.

11. Give examples of countries whose commerce is aided by good government and of other countries whose commerce is retarded by bad government.

12. Point out specific ways in which commerce and industries are aided by education and science.

13. Explain how both capital and labor are necessary in commerce and industry. Give examples from your own knowledge.

14. Summarize the main causes which build up the commerce and industries of a country.

Note. — On pages 579–582 will be found a classified list of books and a list of magazines suitable for reading to supplement the text. In connection with this Chapter I, for example, note the books listed under the heading "History of Commerce."

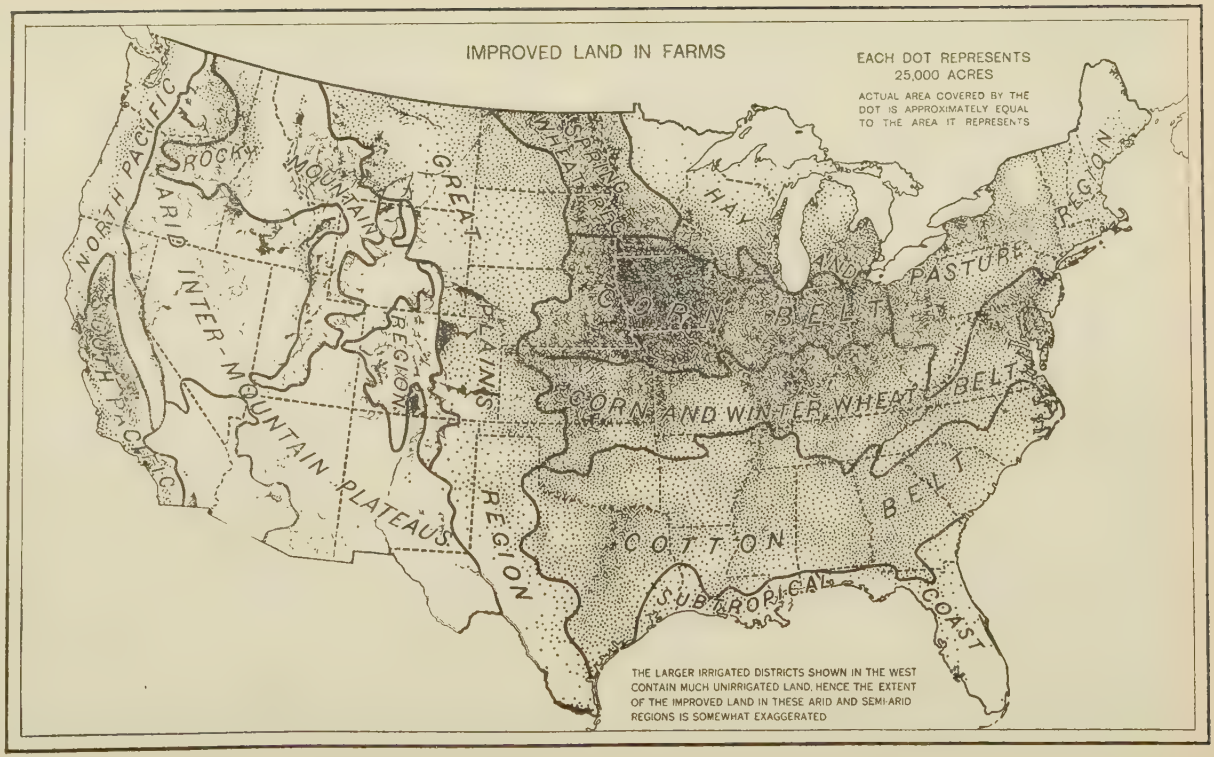
IMPROVED LAND IN FARMS
EACH DOT REPRESENTS 25,000 ACRES
ACTUAL AREA COVERED BY THE DOT IS APPROXIMATELY EQUAL TO THE AREA IT REPRESENTS
NORTH PACIFIC
ROCKY MOUNTAIN
ARID INTER-MOUNTAIN PLATEAUS
SOUTH PACIFIC
GREAT PLAINS REGION
SPRING WHEAT REGION
HAY AND PASTURE REGION
CORN BELT
CORN AND WINTER WHEAT BELT
COTTON BELT
SUBTROPICAL COAST
THE LARGER IRRIGATED DISTRICTS SHOWN IN THE WEST CONTAIN MUCH UNIRRIGATED LAND, HENCE THE EXTENT OF THE IMPROVED LAND IN THESE ARID AND SEMI-ARID REGIONS IS SOMEWHAT EXAGGERATED

FIG. 9. Agricultural regions of the United States. (*From publications of the U. S. Dept. Agr.*)

CHAPTER II

THE UNITED STATES AS A WHOLE AND ITS PHYSICAL PROVINCES

The Economic Progress of the United States. — The United States has become the leading nation of the world in

(1) the output of its mines,
(2) the products of its forests,
(3) the crops from its soil,
(4) the goods from its factories,
(5) the extent of its railroads,
(6) the volume of its commerce, and
(7) the wealth of its people.

In all these particulars the United States — still a young country — has risen to first place among the nations. These are all *material* aspects of our national life, and it is in these material aspects that the United States has made its greatest progress.

The Reasons for the Material Progress of the United States are chiefly as follows:

(1) *Its large area* of about 3,000,000 square miles, or nearly 2,000,000,000 acres, which is more than three fourths the area of Europe with its twenty-seven or more countries.

(2) *Its great extent of agricultural land and great food-producing power* (Fig. 9). The United States has as much land well suited to agriculture as all the nations of Europe outside of Russia.

(3) *Its mineral wealth.* The United States has half the coal of the world, and its deposits of iron, copper, lead, zinc, and petroleum are the largest, or among the largest, known. This is partly due to the large area of the country.

(4) *Its forest wealth.* The forests of the United States still have an enormous amount of merchantable timber.

(5) *Its varied climate, almost everywhere invigorating.* This, in part, explains the energy of the people and their rapid conquest of the continent.

(6) *Its people*, descendants of the most able and energetic peoples of Europe.

In addition, its long sea coast and many harbors, the absence of a high mountain barrier on the eastern side, and the freedom from danger of invasion, due to its remoteness from possible enemies, have also played their part in the growth of the nation.

Territorial Expansion of the United States. — After the thirteen original colonies had won their independence, their territory extended from the Atlantic to the Mississippi, but did

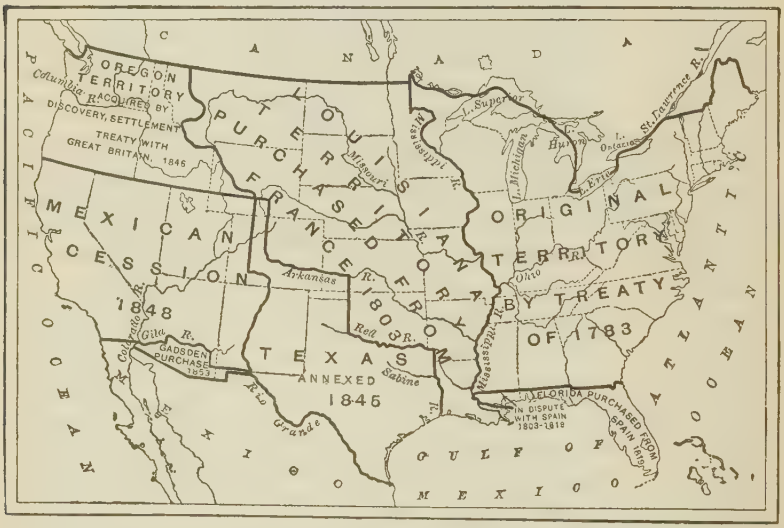

FIG. 10. The original territory of the United States, 1783, and the regions added at later dates.

not include Florida. By the purchase of Florida from Spain, of the Louisiana Territory from France, and of Alaska from Russia, and by the annexation of Texas and the cession of land by Mexico and Great Britain (Fig. 10), the United States became three

times its original size. More recently Porto Rico, Hawaii, the Philippines, the Canal Zone, and a number of small islands have been acquired, but these have not added greatly to the territorial area of the United States. All the large additions were made at times when small value was placed upon the territories acquired. For example, the United States paid only a little more for Louisiana Territory, Alaska, and Florida combined than it paid Denmark ($25,000,000) for the three small Virgin Islands in the West Indies, purchased in 1916.[1]

A Land of Opportunity. — The American people have come into a rich heritage in the land which they possess. The generous terms upon which the United States government sold or gave away its public lands to settlers, the freedom accorded to the people, and the opportunities of every kind, attracted people from Europe in large numbers, and the population passed the 100,000,000 mark soon after 1910. Only three countries have a larger population — Russia, China, and India. No other one of the new lands of the world has attracted immigrants so rapidly. It is estimated that as many Europeans have settled in the United States in the past century as have settled in all the other new lands of the world during that time. But all parts of the United States are not equally fertile, equally well developed, or equally attractive.

The Major Climatic Provinces of the United States

Importance of Climate in Economic Geography. — Of all the geographical influences to which man is subjected, climate is the most important. Through its control of plant life, from which all man's food directly or indirectly comes, climate is the main geographical factor in determining where man may live, prosper, and progress. It determines what crops may or may not be grown; in a large measure it determines the kind of houses man builds for himself; the kind of clothing with which he provides

[1] The United States paid $7,200,000 for Alaska, $15,440,000 for the Louisiana Territory, and $5,000,000 for Florida, a total of $27,640,000.

himself; the kind of food necessary to the maintenance of health; and the kinds of diseases he must combat. It also affects his mental and physical vigor and hence his energy, efficiency, and enterprise. The depressing effect of the continuous, sultry heat of the tropics upon the people is well known, as is the effect of the continuous cold of the long winters upon the people of the frigid regions. Only the intermediate zones produce great peoples and nations.

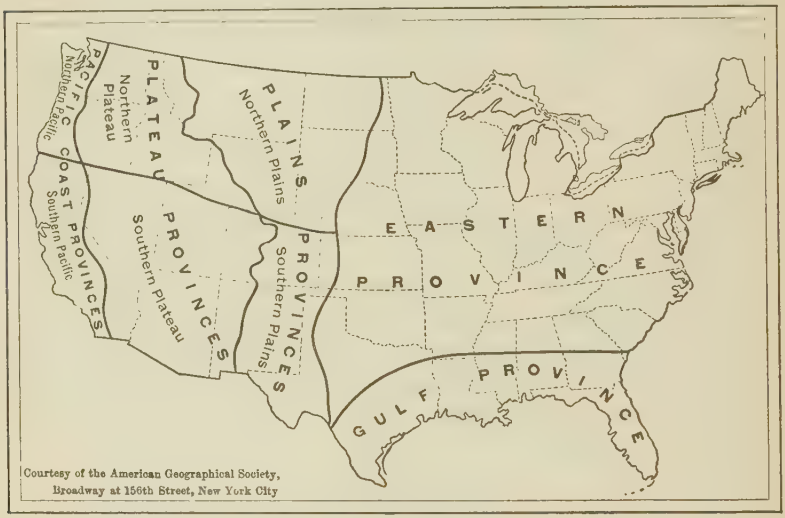

FIG. 11. Climatic provinces of the United States. (*Slightly modified from map by Ward.*)

The Eight Climatic Provinces. — The United States has a north-south extension of from 1200 to 1500 miles, about twenty-five degrees of latitude. Although there is a considerable difference between the mean annual temperatures of our northern and southern states, the change from north to south is gradual, and no hard and fast line can be drawn separating the region with a northern climate from that with a southern climate. Yet everybody recognizes that we have a "North" and a "South" in the United States, and that climate has been the chief factor

in bringing about the conditions which distinguish the North from the South. Also we recognize that the United States has (1) an eastern region with ample rainfall for crops, (2) a Great Plains region where the rainfall is for the most part less than 25 inches a year, (3) a Cordilleran region which includes the principal desert lands of the United States, and (4) a Pacific Coast region with an oceanic climate. Each of these four larger regions has its northern and its southern portions, making eight climatic provinces in all (Fig. 11). Following Ward's [1] classification and names, the most outstanding climatic features of these provinces will be indicated.

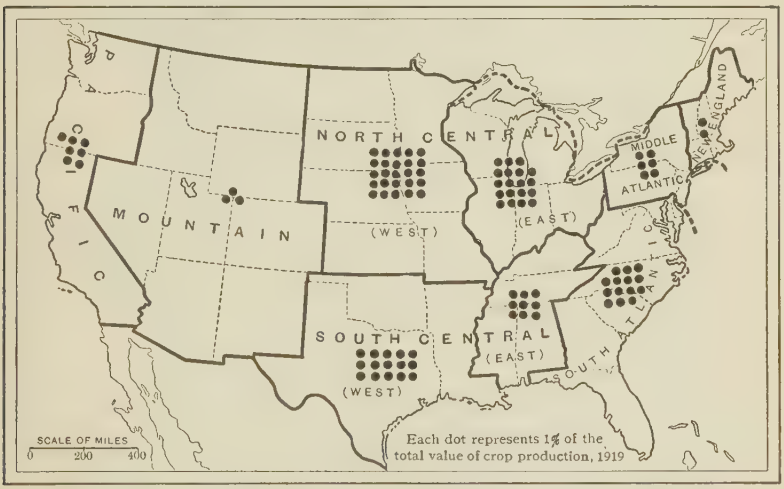

FIG. 12. Percentage of the total crop value of the United States produced by each section.

The Eastern Province is much the largest, and its various portions necessarily differ considerably in climatic character. Yet they agree in having (1) sufficient rainfall to support agriculture, (2) a pronounced change of seasons, (3) rapid and some-

[1] Ward, R. DeC., "Climatic Subdivisions of the United States": *Bulletin of the American Geographical Society*, vol. 47, pages 672–680, 1915.

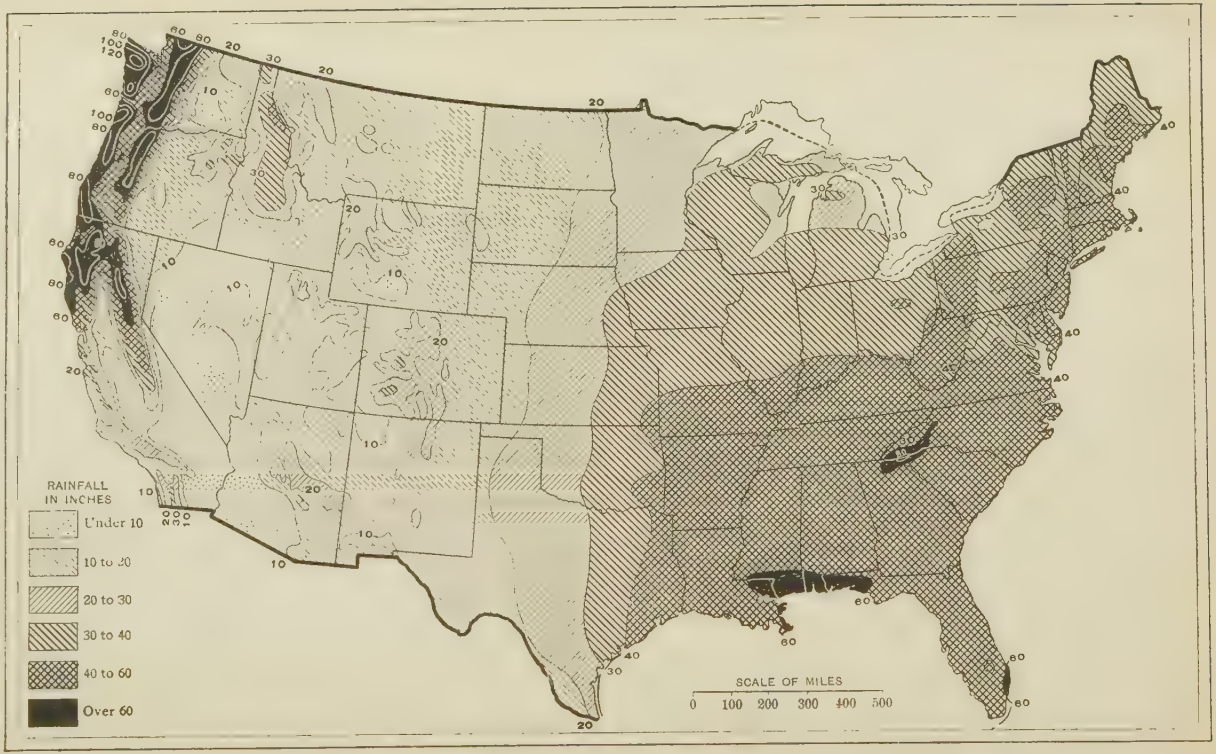

FIG. 13. Average annual rainfall in the United States. (*U. S. Dept. Agr.*)

what extreme changes of weather from day to day or week to week, and (4) a growing season long enough to mature all the hardy crops. (The growing season is the period between the last killing frost in the spring and the first in autumn.) This province is the great agricultural section of the country; it produces fully 85 per cent of the nation's crops. It includes the Corn Belt (Fig. 9), most of the two Wheat Belts, part of the Cotton Belt, the chief dairy sections, and the hay and general farming sections. It is the most populous, most wealthy, and most highly industrialized part of the country; and the favorable climate of the region is a very large factor in producing these conditions.

The Gulf Province is nearly subtropical; snow seldom falls there and never remains; the contrast between winter and summer is much less pronounced than it is in the Eastern province, and the weather changes are less frequent and less rapid. It is under the continuous influence of the breezes from the warm waters of the Gulf of Mexico. The rainfall is heavy (averaging around 50 inches), the growing season is long, and the summers hot and humid. Cotton is the chief crop, but rice, sugar cane, and subtropical fruits are characteristic products.

The Plains Provinces are bounded on the east by the line which marks 20 inches of rainfall and on the west by the Rocky Mountain divide (Figs. 11, 13, and 18). The rainfall is scarcely sufficient for agriculture. During some years crops thrive and during others they partly or wholly fail. Dry farming and irrigation are employed to a small extent. These provinces are, as a whole, rather flat, grass-covered and monotonous, and suited mainly to grazing.

The Plateau Provinces are mainly desert or near-desert, except in the northern third, where rainfall is more abundant. The southern two thirds receives from 5 to 10 inches of rain a year, and here nothing can be raised except by irrigation. The extreme south is the hottest part of the United States. The greater part of the land produces little of value and only a small fraction of it can be irrigated.

The Pacific Coast Provinces have a climate all their own. The northern section has a heavier rainfall than any other part of the United States, exceeding in places 100 inches a year. The temperature is that which is characteristic of west-facing coasts in the belt of westerly winds, which means an oceanic climate, or one without rapid or extreme changes of temperature — mild, rainy winters and fairly dry and cool summers. This is a narrow province occupying only the strip of land between the Pacific and the Cascade Mountains or the Sierra Nevada.

The southern Coast province receives little rainfall except on the mountains, and the extreme south is nearly all desert except where irrigation is employed. The summers are sunny and rainless, and with irrigation, fruit grows in wonderful abundance and perfection. Southern California near the sea is famous for its climate, particularly on account of its mild winters and bright sunshine, resembling the Mediterranean coast of France and northwestern Italy known as the Riviera.

Physiographic Provinces [1]

According to surface features, the United States may be divided into many regions or provinces (Fig. 18), which in turn may be grouped into three major divisions — Eastern, Central, and Western.

The Eastern Slope and Eastern Highlands

The Eastern Slope, or the strip of land lying between the Atlantic Ocean and the Appalachian Mountains, was occupied by the English colonists of pre-Revolutionary days. It includes most of New England, the eastern part of the Atlantic Coastal Plain, and the Piedmont Plateau.

The Coastal Plain. — The Atlantic Coastal Plain is low and nearly flat, with swamps along many of the rivers and near the sea; it is fertile in spots, but much of it is sandy. It was once forested and a part is still wooded. In places where the soil contains considerable clay and marl, it is intensively cultivated and is highly productive.

[1] The teacher may consider it best to use this section (through page 50) for reference purposes rather than as a regular assignment. The map, Figure 18, should be used constantly in connection with any study of this section on the Physiographic Provinces.

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FIG. 14. The beach and boardwalk at Atlantic City, New Jersey, one of the famous seaside resorts of the Atlantic Coastal Plain.

FIG. 15. A glimpse of the Piedmont Plateau.

FIG 16. Relief map of the United States. (*U. S. Geol. Survey*)

Rivers. A moderate sinking of the land has occurred along the eastern coast, drowning the river mouths and making them deeper and broader than they were before, and producing harbors along the shore of New England and at the mouths of the principal rivers as far south as Virginia. South of Virginia the harbors become shallower, for the sinking of the coast has been less. The Hudson River, for example, is now navigable for the lower 150 miles of its course, which broadens into the deep, spacious harbor of New York.

The Piedmont. — The Piedmont Belt, which lies between the Coastal Plain and the Appalachian Mountains, is geologically one of the oldest portions of North America. This belt and the Blue Ridge just to the west are part of an ancient mountain system made up of resistant rocks, while the Coastal Plain is made up of soft sands and clays.

The Fall Line. Where the rivers flow from the harder rocks of the Piedmont Belt to the sandy Coastal Plain, rapids occur; therefore, a line which connects these rapids and which forms the boundary between the Piedmont Belt and the Coastal Plain is called the Fall Line (Fig. 18). The rapids fix the head of navigation of the rivers and sometimes furnish water power. Such points on rivers are favorable sites for cities. Note in Figure 18 how many important eastern cities are on or near the Fall Line.

The Appalachian or Eastern Highlands. — The Eastern Highlands are made up of parts which differ considerably among themselves. In New Hampshire are the White Mountains; in Vermont are the Green Mountains; and in New York are the Adirondack Mountains, and the Catskills. The easternmost ranges of the Appalachians form the ancient Blue Ridge, which is most prominent from Maryland southward. Next, on the west, is the Appalachian Valley with its many even-topped ridges. This valley extends (with interruptions) from Lake Champlain in New York to Alabama, and is from ten to seventy miles wide. The western side of the Appalachian Valley is formed by the face or escarpment of the Allegheny Plateau and the Cumberland Plateau. Naturally, the Eastern Highlands are not for the most part an agricultural region; forests and cut-over lands prevail, but the Appalachian Valley and some smaller valleys contain excellent farms. Coal, oil, and gas are obtained, especially in Pennsylvania and West Virginia. As would be expected, there are only a few large cities, Pittsburgh being the largest.

The eastern mountains as barriers. The eastern mountains are not high; even the highest peaks (5000 to 7000 feet) would be called low in the Rocky Mountains, and their ranges are crossed by relatively low passes ranging

FIG. 13. Field of half-grown corn on the Glacial Plains. The greater part of the Corn Belt of the United States has glacial soils.

from 2500 feet down to the Mohawk gap in New York (400 feet). However, in the colonial days this mountainous belt, covered with a tangle of forests and having scarcely a road or human habitation, was a barrier that effectively checked the westward movement of the colonists.

Gateways through the eastern mountains. Rivers and their valleys are nature's routes of travel, and as such they are highly important features of the earth's surface.

(1) The St. Lawrence River. Only two rivers (the St. Lawrence and the Mohawk-Hudson) rise west of the Appalachians and flow eastward to the Atlantic; the larger of these is the St. Lawrence. From the days when the French held Canada down to the present this river and its valley have been a great natural gateway from the Atlantic into North America.

(2) The Mohawk-Hudson. The Mohawk-Hudson Valley is often called "The Eastern Gateway of the United States." It was this valley that made possible the *Erie Canal*, joining the Great Lakes to the Hudson River and thence to the sea, thereby performing an inestimable service to the country. Important railroads also use this route.

(3) The Pittsburgh Gateway. The third important route across the mountains follows a branch of the Susquehanna River and leads to Pittsburgh at the head of the Ohio River; that city used to be called "the Gateway to the West." This is the route now used by the Pennsylvania Railroad, one of the greatest of American trunk lines.

(4) The Potomac Pass. The notch called the "Narrows" at Cumberland, Maryland, on the Potomac River, affords an entrance leading to the Ohio Valley from Washington and Baltimore. The old National Road and the Baltimore and Ohio Railroad pass this way.

(5) The Cumberland Gap. At the southwestern end of Virginia, between Kentucky and Tennessee, is the Cumberland Gap, the most famous of the mountain passes in the South.

The Central Plains

The Central Plains, more than a thousand miles from east to west, are the garden of North America. They extend from the Gulf of Mexico to the Arctic Ocean, but we are here concerned only with the part that lies within the boundaries of the United States (Fig. 18).

Glacial Plains. — The part of the Central Plains lying north of the Ohio and Missouri rivers was once covered by ancient continental glaciers which left deep and generally fertile soil.

George S. Corfield

125°
120°
115°
110°
105°
100°
C. Flattery
Seattle
Tacoma
Olympia
Spokane
Portland
Salem
Eugene
Astoria
Mt. Rainier
Mt. Hood
Columbia
Snake
Baker
Boise
Coeur d'Alene
Missoula
Butte
Helena
Great Falls
Billings
Yellowstone
Minot
Bismarck
NORTH DAKOTA
Manitoba
Winnipeg
DOMINION
MONTANA
OREGON
IDAHO
WASHINGTON
C. Blanco
Mt. Shasta
Lassen Peak
Mendocino
Humboldt
Reno
Carson City
Sacramento
San Francisco
Oakland
Tonopah
Great Salt Lake
Salt Lake City
Ogden
Logan
Provo
Rock Springs
Laramie
Fremont Peak
Sheridan
Black Hills
Lead
Pierre
SOUTH DAKOTA
Sioux
Niobrara
Cheyenne
Grand Island
NEBRASKA
Greeley
Boulder
Denver
Grand Junction
COLORADO
Colorado Springs
Pikes Peak
Pueblo
Arkansas
Hutchinson
Wichita
Trinidad
Raton
Santa Fe
Las Vegas
Canadian
Oklahoma City
OKLA
Albuquerque
NEW MEXICO
Roswell
Pecos
Llano Estacado
Fort Worth
Brazos
Red
Colorado
Austin
San An
TEXAS
Rio Grande
Laredo
Brownsville
MEXICO
Gulf of California
Prescott
Phoenix
Gila
Tucson
Douglas
ARIZONA
Los Angeles
San Diego
Pt. Conception
Grand Canyon
Colorado
Wasatch Mts.
Sierra Nevada
Mt. Whitney
Humboldt
Great Salt Lake
Yellowstone National Park
Missouri
Platte
Cheyenne
Niobrara
Arkansas
Canadian
Pecos
Llano Estacado
Brazos
Colorado
Rio Grande
Gulf of California
Lower California
BASIN RANGES
ELEVATIONS IN FEET
Over 5000
2000 to 5000
1000 to 2000
500 to 1000
Sea Level to 500
Land below Sea Level
DEPTHS IN FATHOMS
0 to 100
100 to 1000
1000 to 2000
Over 2000
COPYRIGHT, BY AMERICAN BOOK COMPANY
115°
110°
105°
Longitude
100°

90
85
80
75
70
45
40
35
30
25
CANADA
Quebec
Montreal
Ottawa
Toronto
Niagara
Buffalo
Rochester
Albany
Boston
New York
Providence
Hartford
Portland
Augusta
Bangor
MAINE
Mt. Katahdin
St. John R.
St. Lawrence R.
Lake Champlain
Adirondack Mts.
White Mts.
Green Mts.
Concord
Manchester
Worcester
Taunton
C. Cod
NANTUCKET I.
MARTHA'S VINEYARD
CONN.
NEW JERSEY
Trenton
Wilmington
Dover
Baltimore
Annapolis
Washington
Philadelphia
Reading
Harrisburg
Pittsburgh
Erie
Cleveland
Akron
Youngstown
Toledo
Detroit
Lansing
Saginaw
Flint
Grand Rapids
Kalamazoo
Milwaukee
Racine
Chicago
Madison
Dubuque
Rockford
South Bend
Ft. Wayne
Indianapolis
Terre Haute
Evansville
Louisville
Cincinnati
Columbus
Dayton
Wheeling
Charleston
Richmond
Norfolk
Portsmouth
Roanoke
Lynchburg
Petersburg
Winston-Salem
Raleigh
Wilmington
C. Hatteras
C. Fear
Charlotte
Asheville
Knoxville
Chattanooga
Nashville
Memphis
Little Rock
Columbia
Charleston
Augusta
Atlanta
Macon
Savannah
Birmingham
Montgomery
Meridian
Vicksburg
Jackson
Natchez
Mobile
Tallahassee
Jacksonville
Pensacola
New Orleans
Baton Rouge
Beaumont
Galveston
C. San Blas
Delta of the Mississippi R.
Tampa
Tampa Bay
Lake Okeechobee
Miami
Nassau
Key West
C. Sables
Havana
CUBA
BAHAMA ISLANDS
Florida Straits
TROPIC OF CANCER
Gulf of Mexico
Atlantic Ocean
Lake Superior
Lake Michigan
Lake Huron
Lake Erie
Lake Ontario
Mississippi R.
Missouri R.
Ohio R.
Rio Grande
Colorado R.
Great Plains
Great Lakes
Appalachian Mts.
Rocky Mts.
Ozark Plateaus
Interior Highlands
Coastal Plains
Prairie Plains
Driftless Area
Lake Plains
Ohio Valley
Kentucky
Tennessee
Arkansas
Louisiana
Mississippi
Alabama
Georgia
South Carolina
North Carolina
Virginia
West Virginia
Pennsylvania
New York
Indiana
Illinois
Wisconsin
Michigan
Minnesota
Iowa
Missouri
Kansas
Nebraska
Oklahoma
Texas
Colorado
New Mexico
Arizona
Utah
Nevada
Wyoming
Montana
North Dakota
South Dakota
Idaho
Oregon
Washington
California
Fig. 18
THE UNITED STATES
Showing
Physical and Political Features
SCALE OF MILES
0 100 200 300 400 500
from Greenwich
L.L. POATES CO., N.Y.

Lake Plains. — The plain which forms a part of Minnesota, the Dakotas, and Manitoba and which is now drained by the Red River, is a region of striking flatness and remarkable fertility. At one stage of the glacial period a lake (glacial Lake Agassiz), larger in area than all the present Great Lakes together, covered this region and spread over it a layer of silt, forming a lake plain, now a part of the principal spring wheat belt of North America.

Other lake plains border the Great Lakes and include most of southern Michigan.

Mississippi Flood Plain and Delta. — From the mouth of the Ohio River to the Gulf of Mexico, the Mississippi for ages has been slowly building its delta southward, annually overflowing its flood plain, and depositing silt upon it. Thus has been formed a large area of alluvial soil; some of it is the rich "bottom lands" of the lower Mississippi and its branches, but some is too low and swampy to be used. Both east and west of this flood plain (Fig. 18) are extensive parts of the Atlantic Coastal Plain (page 40).

Ozark Plateaus. — While the greater part of the Mississippi Valley is made up of plains, there are a few regions of low mountains, the chief of which are the Ozarks in Missouri and Arkansas.

Great Plains. — Practically all parts of the Mississippi basin thus far mentioned have a rainfall ranging from 30 to 50 inches a year, which is ample for agriculture. From the Mississippi River the land gradually rises toward the west and the annual rainfall becomes less and less. At the 100th meridian (Fig. 18) the land has an elevation of about 2000 feet above sea level, and the annual rainfall is about 20 inches, the least that will support successful farming of the ordinary kind. As one travels farther toward the west, say across Kansas into Colorado, the Great Plains rise very gradually; timber land is rarely seen; corn fields give place to wheat fields, and still farther west, as the country becomes drier, farm crops are seen less and less frequently; grass lands take their place and then the grass grows thinner and presently the front range of the Rocky Mountains looms in sight.

The Western Cordillera

Rocky Mountains. — The Rocky Mountains are the eastern ranges of the great Cordilleran system of mountains and plateaus which form the western third of the United States. In the larger part of the Cordilleran region the rainfall averages too low for the raising of ordinary crops, and

forests grow only on the mountains, where the rainfall is somewhat heavier. The government still owns much of the land and allows the cattlemen and sheepmen to use it for grazing (Fig. 19). In the valleys some farming and fruit growing is carried on, both with and without irrigation. In these

Fig. 19. Sheep grazing in the Uinta National Forest in Utah. Here on the mountain slopes the rainfall is sufficient for the production of grass and even forests.

mountains mining is a leading industry, and many of the towns grew up as mining camps.

Great Basin. — The Great Basin is largely desert. The few streams in this region do not flow to the sea, but enter salt lakes, such as the Great Salt Lake of Utah, or gradually sink into the porous ground. In all this Great Basin region, which is larger than New England and the Middle Atlantic States combined, there is only one city of any considerable size, Salt Lake City.

Columbia Plateau. — The Columbia Plateau is as large as a half dozen good-sized eastern states. It is unlike any other large area in the country in that the plateau is built up of beds of solidified lava, now hundreds of feet deep, covering over 200,000 square miles. The climate is dry, but the region includes a large area, chiefly in eastern Washington, where wheat is grown on a large scale by dry-farming methods.

Colorado Plateau. — The Colorado Plateau includes parts of Colorado, New Mexico, and Arizona. Into this plateau the Colorado River has cut

the most wonderful canyon in the world, — the Grand Canyon of Arizona, nearly a mile in depth. The region is dry and in places it is absolute desert.

Pacific Ranges. — There are many Pacific ranges, known by different names, but the principal ones are:

(1) The Sierra Nevada range in eastern California,

(2) The Coast Ranges extending the entire length of our Pacific Coast, and close to it, and

(3) The Cascade Mountains extending north and south through central Oregon and Washington.

Between the Coast Ranges on the west, and the Sierra Nevada, farther east, is a broad valley known as the **California Valley.** This depression, which forms a striking feature on a relief map of California, is 400 miles long and 50 to 60 miles broad.

Farther north, about Puget Sound, is another great valley between the Coast Ranges and the Cascade Mountains.

Exercise

1. Why has the United States been able to make very rapid progress?
2. Why was the United States able to buy Louisiana Territory, Alaska, and Florida at low cost?
3. Why is the United States regarded as in a peculiar sense "a land of opportunity"?
4. Why is it said, "Of all the geographical influences to which man is subjected climate is the most important"? Discuss the correctness of this statement.
5. Why has the United States a great variety of climates?
6. Why is rainfall a highly important factor in the climate of a region?
7. Why is the Eastern province (Fig. 11) of the United States the one of greatest importance?
8. Why is there a "Fall Line" in the eastern United States? To what are the "falls" due?
9. Why have the "gateways" through the eastern mountains been important in the history of the country? Point out these gateways on a map.
10. Why is the western part of the Great Plains ill suited to agriculture?

CHAPTER III

THE CEREALS AND CEREAL PRODUCTS

Plant Life and Food Production. – Among the many varieties of plants there are some that supply food to the lower animals and to man, all of whose food comes directly or indirectly from plant life; for beef, pork, mutton, milk, eggs, and other animal substances are made-over plants which were eaten by the animals, and in their vital processes transformed into food which man can use. Plants take substances from the air, water, and soil, and with the aid of the sun's heat and light are able to convert them into grains, fruits, and vegetables. Consider, for example, the grains, which are highly nutritious foods; they are the seeds which the plants produce for the purpose of continuing their own existence. In each normal seed there is a tiny germ-plant waiting to spring into new life; and in the seed the parent plant has stored away a little food to nourish this young plant as soon as it starts to grow. This food, which is stored away in corn, wheat, rice, barley, rye, and other seeds for the future use of the plant's children, is taken by man for his own use.

Wild and Domesticated Plants. — All our cultivated food plants are descended from ancestors that once grew wild, but by cultivation, selection, and breeding, man has greatly improved them as producers of food. By carefully selecting seeds from only the finest and healthiest plants, and by using only the choice seeds for planting year after year, man gradually improves the plants so that they yield two, three, or even five times as much food as they did in the beginning.

Wheat

An Ancient and Nearly Universal Food. — As far back in the past as we have any knowledge of man, he used wheat for food;

to-day over a thousand different varieties are recognized and named, and wheat in some form is eaten by every civilized people. No other cereal except rice compares with it in the quantity that is annually grown and consumed. Its importance lies both in its high food value and in its superior bread-making qualities. The gluten in the flour gives the dough a sticky quality which retains the gases developed by the yeast, and their expansion causes the dough to "rise" and form a light, spongy bread. Flour from rye, barley, corn, and rice will make bread, but such breads do not possess the light and spongy quality that makes wheat bread so acceptable.

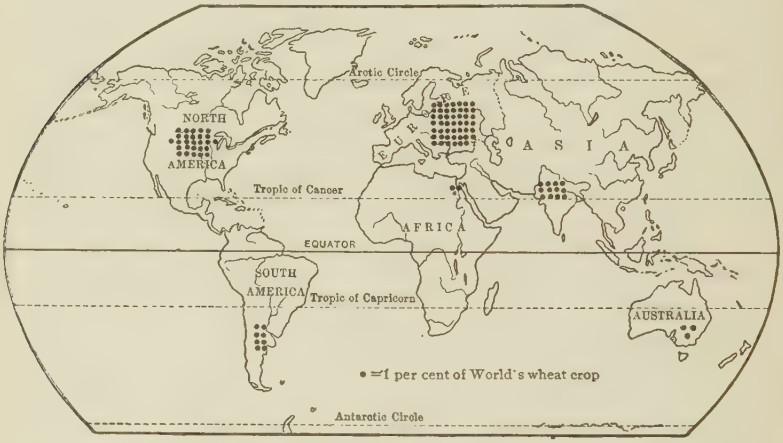

FIG. 20. Average percentage of the world's wheat crop produced in each continent. Each dot represents 1 per cent.

Where the World's Wheat is Grown. — Wheat is a hardy grain, growing as far north as 60° north latitude. In India and Egypt it is grown as a winter crop in the warmest part of the temperate zone; it also grows in parts of the torrid zone, but only at rather high altitudes, where the climate is cool. For example, most of the wheat used in Mexico is grown on the central plateau at an elevation of about 7000 feet.

Among the six continents, Europe is the largest producer of wheat, and North America ranks second. India and western Siberia are the leading Asiatic countries that raise wheat for export. In the southern hemisphere Argentina and Australia are the chief producers. The United States and Russia (under normal conditions) grow the largest quantities of wheat of all the countries; each has produced as much as a billion bushels in a single year. France, Hungary, and Italy are important wheat-raising countries; and Canada has become one of the five leading countries in the growing of this crop. These facts of wheat production are best fixed in mind by a study of Figures 20 and 21.

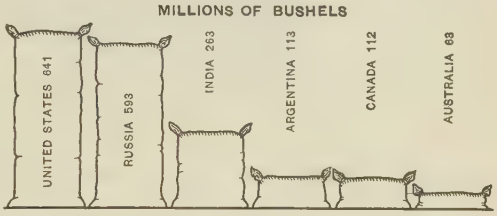

FIG. 21. Average annual production of wheat in six leading countries, 1895–1914. (*U. S. Dept. Agr.*)

Conditions Most Favorable to the Growing of Wheat. — *Climate.* Wheat is at its best in the cooler part of the temperate zone. It is not a thirsty plant and requires less water than most of the cereals; it grows well on 30 inches of rain a year; in fact, a large proportion of the wheat of the world grows in regions of light rainfall — 25 inches or less. The ideal climatic conditions are (1) a cool, wet spring, (2) a moderately dry summer, and (3) a sunny and rainless autumn. If the spring is cool and wet, each seed that grows sends up several stalks; from a single grain of wheat as many as twenty-five stalks may grow. Commonly, however, there are only five or six. The wheat plant has its own special diseases, and these are most likely to attack it in warm, moist weather; hence the advantage of a cool, fairly dry climate. A rainless harvesting season is desired for curing, threshing, and marketing the crop.

Soil. Wheat will grow well in a variety of soils, but the rich, black, clay-loam soils are most favorable. It is true that the largest number of bushels to the acre are grown in England,

Belgium, and Germany, under rather intensive cultivation; yet the great export crops of the world come from the wide, level plains of the newer and cheaper lands. On these level lands modern machinery can be used to greatest advantage, and wheat

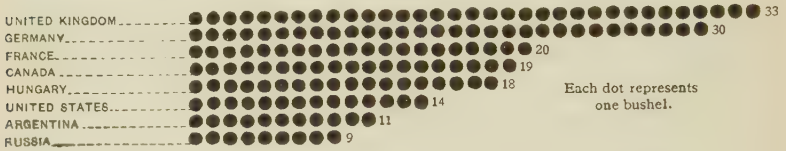

FIG. 22. Average wheat yield per acre in selected countries.

can be grown at a low cost. Hence the relatively cheap but fertile lands of central North America, Australia, Argentina, and Russia are the ones which provide a large part of the export wheat of the world.

Classes of Wheat. — There are wide differences among the varieties of wheat.[1] Certain varieties are classed as *hard wheats;* they usually grow in a dry climate, have a high percentage of gluten, and make the lightest bread. In North America these varieties grow in the Dakotas, Minnesota, western Canada, and as far south as Texas. The hard varieties are mostly *spring wheats;* that is, they are sown in the spring.

Winter wheat, which is sown in the fall, has a higher proportion of starch and a lower proportion of gluten. It springs up in the fall, covers the ground before the snow comes, lives through the winter, and is harvested in midsummer. It is raised mainly in the Central States as far south as Texas (Figs. 9 and 23); it forms about two thirds of our total crop.

Durum wheats, recently introduced into this country, were brought to America from eastern Europe. They are hard wheats which by long experience in dry lands — lands of 15 to 20 inches of rainfall — have acquired the ability to live in a dry climate,

[1] Under the Official Wheat Standards of the United States, wheat is separated into five commercial classes: (1) Hard red spring, (2) Durum, (3) Hard red winter, (4) Soft red winter, and (5) White.

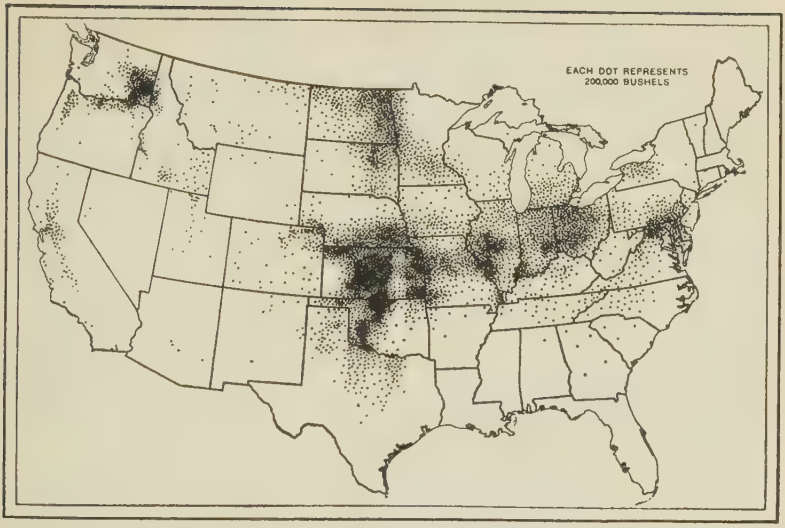

FIG. 23. Wheat-producing regions of the United States. (*U. S. Dept. Agr.*) Compare with Figure 9.

such as that of the central part of our Great Plains (Fig. 24). These wheats contain a high proportion of gluten, and therefore are used in making macaroni and are blended with the *soft wheats* in making bread flour.

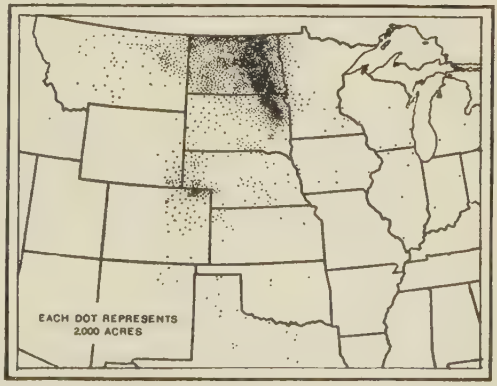

FIG. 24. Regions where durum wheat is grown; only a small part of the total wheat acreage. (*U. S. Dept. Agr.*)

Scientific workers in agricultural experiment stations and colleges are constantly experimenting with new varieties of wheat, seeking to find or to produce varieties that will grow in regions that are not now

yielding wheat successfully. Results of immense value have come from these experiments; for example, the United States is now raising 50,000,000 bushels of durum wheats a year on lands that formerly produced very little of value.

Westward Movement of Our Wheat Belt. — Wheat is grown in nearly every state in the Union, but it is now the principal crop in a group of states reaching from Kansas northward to the Canadian border (Fig. 23). Wheat growing moved westward along with the frontier and the pioneer. Western New York was once the principal wheat-raising region of the country, and Rochester, at the falls of the Genesee, was once the leading flour-milling city. As settlers moved westward into Ohio, Indiana, Michigan, Illinois, Iowa, Wisconsin, and Minnesota, these states successively became large producers of wheat. On the fertile, new lands of the prairies, wheat grew easily and abundantly; and there was always a market for wheat in the East and in Europe. Wheat has a higher value in proportion to its weight than most other crops; it is easy to handle and easy to ship, and it keeps well. All these considerations made wheat the money crop of the new western farm lands, just as it is now the money crop of the newer lands of our West and of Argentina, Australia, and western Canada.

Another reason for this movement of wheat raising to new lands was the temporary exhaustion of land when wheat is grown year after year in the same soil. Diseases and pests such as the chinch bug, Hessian fly, and the "rust" attack the growing wheat when this crop is raised continually on the same land. Kansas and North Dakota and the states between are now our chief wheat-producing states, and wheat is the principal crop also in the semi-arid lands of eastern Washington and Oregon.

The Relation of Transportation to Wheat Raising. — No other grain travels so far and in such quantities as does wheat and its flour. Its market is world-wide, and its price is fixed by world supply and demand. For example, the price of wheat in Winnipeg or Liverpool promptly rises on reports of drought in

Argentina, and the price in Australia may fall on news of ample rains in Kansas. Since a large fraction of the world's wheat travels long distances, good transportation facilities are demanded; if they are not provided the wheat farmer makes little or no profit from his season's work, and he will not continue to raise wheat. In the early days of wheat growing in our Central States, the Great Lakes and the Erie Canal provided cheap

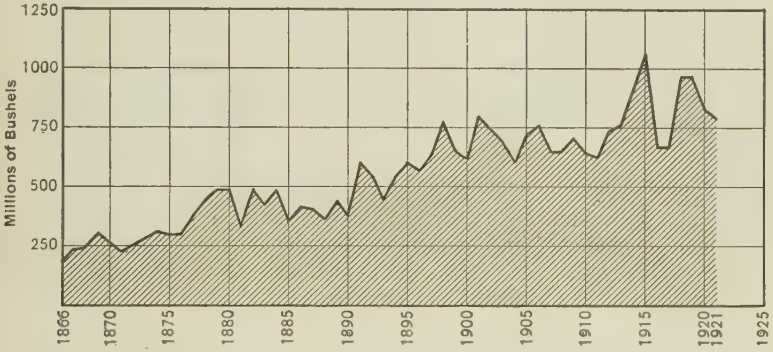

FIG. 25. Annual production of wheat in the United States. (*U. S. Dept. Agr.*)

transportation from the interior to New York; and even now a large amount of wheat is carried eastward on the Great Lakes. The rapid building of railroads in our own wheat-raising states and also in Canada and in Argentina was directly connected with the extension of the wheat lands. The two had to expand together. One cause that has retarded wheat growing in Siberia, for example, is the long haul necessary to reach the coast, and the poor means of transportation in that vast country. There is little profit in raising wheat in the United States twenty miles from a railroad.

Methods of Producing and Marketing Wheat. — In densely peopled countries like China, Belgium, and Italy, the ground is not uncommonly dug up with a spade or some other hand tool, and the wheat sown by hand and reaped with a sickle. This is small-scale, intensive cultivation, and the yield per acre is

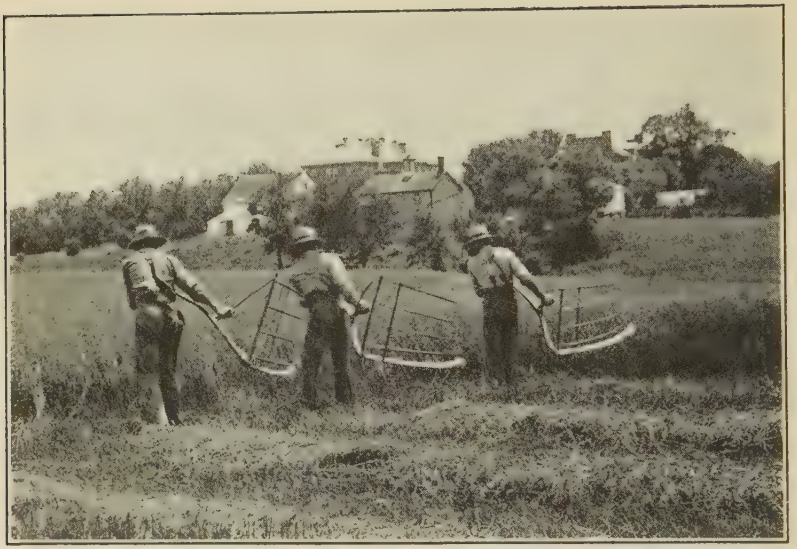

FIG. 26. Cutting grain with the old-fashioned cradle, which is more efficient than the sickle (Fig. 288), but less so than the reaper and binder.

FIG. 27. Two reapers and binders drawn by a tractor. The grain is cut, bound into bundles, and carried until a number of bundles are dropped off in a heap.

frequently very large, — twice the average yield in the United States. But in new countries like the United States, Canada, and Australia the wheat farms are large, and modern machinery is used. Gang plows drawn by several teams of horses or by tractors turn from four to eight furrows at once (Fig. 5), and harrows and seeders twenty feet wide cover a large area of ground in a day's work (fifty to sixty acres); harvesters that cut and bind the grain, and even cut, thresh, and bag it at one

Fig. 28. Combined harvester and thresher used in the dry climate of the Far West, where the grain cures while standing and, after going through this machine, can be sacked and marketed immediately.

operation, are sometimes employed (Figs. 27, 28). A combined harvester and thresher drawn by twenty-four to thirty-two horses or by a tractor will cut, thresh, and bag a thousand bushels of wheat a day. On some of the large wheat farms (or ranches) in Washington, six or eight of these great machines may be seen operating at once. After the threshing, the wheat is usually cleaned, stored, and graded. The large wheat farm seldom has sufficient storage room for all the wheat that it raises, and the grower has to sell it promptly or rent storage space in a warehouse or elevator. This need of special storage space and means of handling large quantities of grain has given

FIG. 29. Grain elevators in Minnesota. The elevators are built in separate units for storing various grades or kinds of grain.

rise to a special structure known as the *grain elevator*, which is able to handle grain very rapidly, and which can store it in large quantities (Fig. 29). Some of the elevators hold 2,000,000 bushels or more. Small elevators are numerous along the railways in the Wheat Belt, and immense ones are located at the important milling, transshipping, and exporting points. The vast amount of wheat that is grown and shipped in the United States has brought into use a highly perfected system of buying, selling, grading, storing, shipping, and news distributing, which employs every aid that the mind of man can devise, including the sending of market reports broadcast by radio.

Flour-Milling Centers. — In the early days of this country wheat was grown in nearly every community in the northern states, and was ground into flour in thousands of small mills. Before the days of good roads or railroads most of the things needed by the country people had to be supplied within the community or at no great distance away. Then, little gristmills and flour mills were numerous throughout the farming regions — perhaps a score of them in a single county — and nearly all of them were driven by water power. When canals and railroads were built, and the West was opened to settlement, wheat grow-

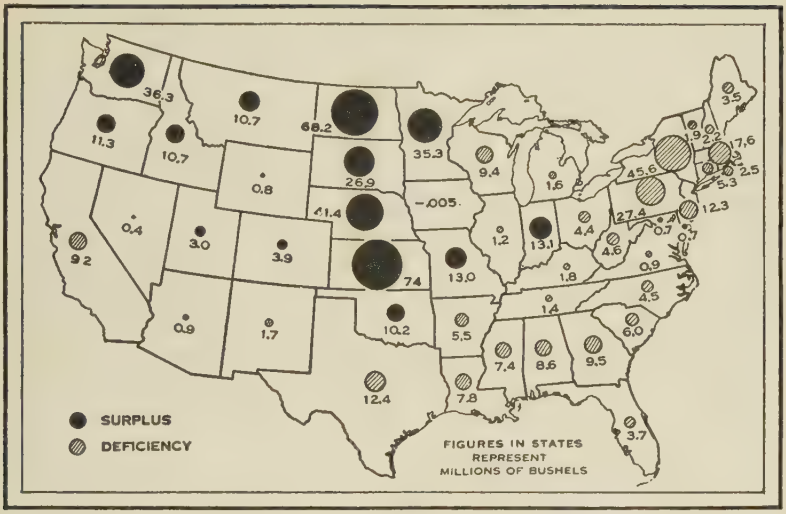

FIG. 30. Surplus or deficiency of wheat in each state; five-year average. (*U. S. Dept. Agr.*)

ing declined in the East and became the chief interest in the West, where the broad plains furnished cheap and fertile lands. The village flour mills and many of the city mills in the older states gradually closed down, and eastern people purchased more and more of their flour from western mills. In the seventies the roller process of grinding wheat came into use. In the modern steel-roller mills, the hard spring wheat could be successfully ground, and this wheat rapidly became the favorite variety for bread flour. During these years of change the flour-milling centers tended gradually to move toward the western wheat fields, although New York and Buffalo have remained leading flour-milling cities. In the Central States, Kansas City, Chicago, St. Louis, Wichita, Louisville, and St. Joseph hold high rank, but Minneapolis, at the falls of St. Anthony on the upper Mississippi, has become the foremost flour-milling city not only in the United States, but in the world. During the months of September, October, and November more than a thousand car-

loads of grain a day enter that city, which has about fifty terminal elevators, capable of storing 40,000,000 bushels at a time. Its modern mills (Fig. 153) — more than twenty in number — grind from 70,000 to 80,000 barrels of flour a day; yet flour mills are still so widely distributed over the country that Minneapolis grinds only 12 per cent of the flour ground in the United States. Since wheat is grown somewhat in nearly all the states, several thousand mills, large and small, are still in operation throughout the country, but the flour ground in the smaller mills is used near by. On the Pacific coast, Seattle and Tacoma are leading flour-milling centers.

Wheat and Flour in Our Export Trade. — A generation or more ago, before the population of the United States had become as large as it is now, this country was the greatest of all exporters of wheat. With the breakdown of Russia during the World War, the United States again became the largest exporter, and remained so for some years. The value of the flour and wheat sent abroad in one year has reached beyond $800,000,000, or an average of more than $2,000,000 worth every day; but even this great amount was only a third as much as we consumed at home.

It is to our interest to export wheat in the manufactured form of flour, for by so doing our mills and workmen get the work and the profit involved in milling the flour; and the bran, which is rich in phosphates, is fed to the live stock in this country and returns to the land. The greater part of our export wheat is sent to the crowded countries of Europe, especially to Great Britain; but important quantities are sent to Latin American countries, and to the Orient. In the years following the World War, wheat and flour formed one of our most valuable exports, but that condition is not likely to be permanent, for we shall need a constantly increasing amount at home.

Corn

Importance of the Crop. — The corn crop of the United States is the largest cereal crop produced in this or any other

country; 70 per cent of the world's annual crop of corn is grown in the United States. It is the only one of the grains which was unknown in the Old World before the discovery of America. Corn was the Indian's chief gift to the white man. Now our annual corn crop is greater in quantity than all our other cereal crops together, in some years exceeding 3,000,000,000 bushels. Its importance lies mainly in its relation to our meat industry, for corn is one of the best of feeds for fattening cattle and hogs. Only a small fraction of the crop in the United States is used for human food and, as a rule, relatively little is exported. It is more largely used for food in the South than in the North; in Mexico it is the principal food of the common people.

Where Corn Grows Best. — Corn loves the sun and the warm rains, and it loves warm summer nights — the warmer the better. It grows well in the climate of our southern states, but not so well in the torrid zone, except at considerable altitudes. It thrives best in the states from Ohio to central Kansas and from Kentucky to southern Wisconsin (Fig. 31). Here, on the broad,

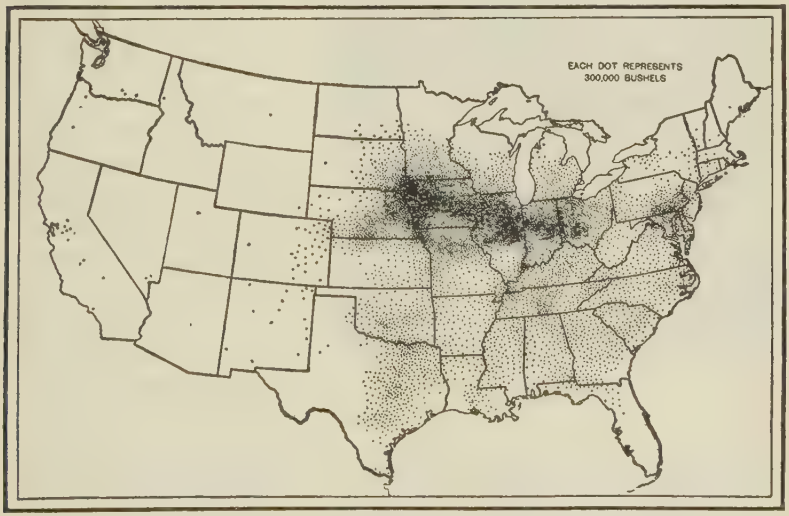

FIG. 31. Corn-producing regions. (*U. S. Dept. Agr.*)

level plains with their deep black soils, the corn plant rises to its greatest yield (Fig. 17). It needs not only four or five months without frost, the warm July nights, the hot August sun, the frequent summer rains, and the deep prairie soil, but it seems also to need the threat of cold winters in order to bring forth its greatest yield of grain. In the tropics or near the tropics, the stalks grow lustily, but they bear few ears and small ones. There is no other corn-growing region that compares with the Mississippi Valley. It will be seen from Figure 31 that the region of greatest corn production is in the North Central States, especially in Iowa, Illinois, Nebraska, Missouri, Indiana, and Ohio. These six states produce over half of the corn raised in the United States, and as much as all the rest of the world outside the United States. Both Illinois and Iowa frequently produce 400,000,000 bushels of corn each year.

FIG. 32. Picking seed corn in Iowa.

How Special Varieties of Corn have been Developed. — In recent years scientific plant breeding has grown into great importance, and this is notably true in the case of corn. By selecting

the ears that ripen earliest, and using only these for seed year after year, plant breeders have developed varieties of corn that will ripen in the short summers of the northern states, and thus the Corn Belt has been extended and the corn yield increased. A great deal has been accomplished through corn-growing clubs and contests among farm boys, who have made some astonishing records in corn production.

Relation of Corn to Meat Production. — About 84 per cent of the corn grown in the United States is consumed on the farms, and most of it on the farms where it is grown. Unlike wheat, only a small part of the corn ever enters into commerce. About one fifth of the corn is fed to horses and mules; two fifths to hogs, and one fifth to cattle and poultry (Fig. 33). Only about 7 per cent is ground into meal. Corn is rich in oil, which makes it especially good for the fattening of hogs and cattle. So largely is the crop used for this purpose that there is a saying in the Corn Belt that "It is more profitable to drive the corn to market than to haul it." The United States is the largest producer and consumer of meat, and our huge corn crop makes this possible. The principal meat-packing cities — Chicago, Kansas City, Omaha, St. Louis, St. Joseph, Sioux City, St. Paul, Indianapolis — and several others are in the Corn Belt. Our sales of meat abroad run into the hundreds of millions of dollars a year, but like wheat and flour, more and more meat will be required for home use in the future.

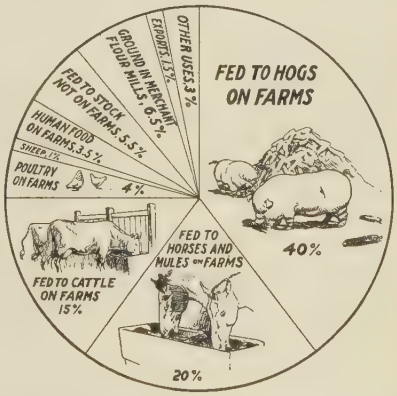
FED TO HOGS ON FARMS
40%
FED TO HORSES AND MULES ON FARMS
20%
FED TO CATTLE ON FARMS 15%
POULTRY ON FARMS 4%
SHEEP 1%
HUMAN FOOD ON FARMS, 3.5%
FED TO STOCK NOT ON FARMS, 5.5%
GROUND IN MERCHANT FLOUR MILLS, 6.5%
EXPORT 1.5%
OTHER USES 3%

FIG. 33. How the corn crop of the United States is used. (*U. S. Dept. Agr.*)

Corn Production Outside of the United States. — A small amount of corn is grown in southern Canada, but in most parts

of Canada the summers are too short and too cool for this crop. From Mexico southward through the highlands of Central America and western South America, patches of corn are everywhere grown for the food of the working people, but the quantity is small and the quality is poor. In Argentina corn is an important crop, and that country usually exports more corn than does the United States, though it produces only one sixteenth as much (Fig. 34). Corn is grown in the south of Europe; a little in southern France, somewhat more in northern Italy, and still more in the Danube Valley and in southern Russia. Yet all of Europe produces less corn than is grown in two of our Corn Belt states.

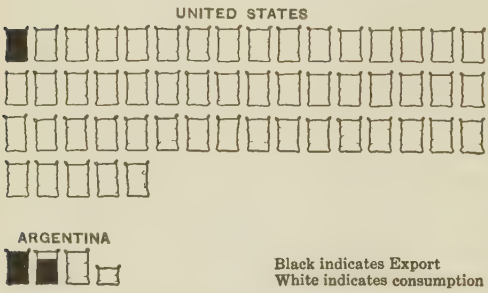

FIG. 34. Average annual production and export of corn, 1900–1920. Each bag represents 50,000,000 bushels. (*U. S. Dept. Agr.*)

OTHER CEREALS

Oats. — Oats are used mainly as a feed for farm animals, particularly for horses. Like corn, oats are largely consumed on the farm where they are grown, and consequently do not enter into commerce on any such scale as wheat does. A small quantity is made into oatmeal, about the only form in which oats are used for human food. The oat crop of the United States and of the world is considerably larger than the wheat crop, but is less important. About 60 per cent of the world's oats are grown in Europe, 26 per cent in the United States, and only 14 per cent in all the rest of the world. In North America oats are grown in the cool, humid, northern states and in southern Canada. They grow best in a region of cool temperature, considerable

rainfall, and loam soil. They are not an important crop in our southern states or on the Pacific Coast, but are one of the leading crops of the North Central States, especially Iowa, Illinois, Minnesota, and Wisconsin, where the crop fits in well with the other crops with respect to its demands upon the farmer's time.

Rye. — Rye resembles wheat. It is the chief breadstuff of some 200,000,000 people in central and eastern Europe. Rye bread is heavier, darker, and slightly less nutritious than wheat bread; but rye will grow on poor land, on land that will not yield a profitable crop of wheat or corn. The sandy plains of Prussia, Poland, and Russia produce more rye than all the rest of the world, and here it is eaten by the working people of these lands, to many of whom white bread is a luxury. Unlike wheat, which is the greatest traveler among the cereals, rye is exported but little from the countries where it is grown. Formerly Russia exported a large part of its wheat, and the Russian people consumed at home the less salable rye.

In the United States rye is grown on the more sandy areas of the North Central and Middle Atlantic States, but it is not very important; it forms only about 1 per cent of our total cereal crops.

Barley. — Barley is grown more widely over the earth than rye, but it is not an important crop in the United States. It has one quality that makes it a valuable breadstuff in certain parts of the world, — namely, its ability to ripen in a short season. It is very hardy, and grows in the far north of Europe even beyond the Arctic Circle, where the season is too short for other grains to ripen. It also is able to grow on the edge of the desert, where the rainfall is too light or the rainy season too short for other cereals. In countries like China, Japan, and India, where two or more crops are obtained from the land in one year, barley is much grown because of its ability to mature quickly. Barley bread is little eaten in the United States. The total production of barley in this country is not large, and most of the crop is fed to farm animals. In the United States barley is

grown chiefly in the Dakotas, Minnesota, Wisconsin, and on the Pacific Coast. In northern Africa and in southern Russia it is a leading crop, produced in the latter country to the extent of hundreds of millions of bushels a year.

Rice. — Rice competes with wheat for first place as a cereal food for the human race. It is an excellent food, but not so nutritious as wheat. It is grown only in warm lands, though not necessarily in tropical lands. A very small quantity of upland rice is grown on land as dry as that used for wheat, but most of the rice is of the wet-land variety. It loves water, and during a part of its period of growth it must be actually under water; and this means that it must be grown on lands that can be flooded and drained. The great rice-growing countries are in southern and southeastern Asia, in the region of the monsoon winds with their heavy downpours of summer rain. In China, Japan, India, and the East Indies, with their swarming populations, over 90 per cent of the world's rice is grown, and rice is the daily food of a third of the human family. It suits well a simple mode of life. Wheat must be ground into flour, and the flour made into bread, both of which operations require skill, labor, and time; but a handful of rice may be thrown into a pot of boiling water and in twenty minutes it is ready to eat.

In the United States rice is a crop of increasing value. For many years most of the American rice was grown on the swampy lands of the Coastal Plain in South Carolina and Georgia. Now it is almost all grown in Louisiana, Texas, California, and Arkansas, in large fields that are capable of irrigation and drainage at will (Fig. 35). On these lands the rice grower controls the water supply and suits it to the needs of his crop; in the autumn he drains the land and harvests and threshes the rice with modern machinery, very much as wheat is harvested and threshed. The Sacramento Valley of California has made remarkable progress in this industry in recent years. The United States now produces more rice than it uses; some Asiatic rice is still imported, but our exports of rice are twice as great as our imports. In spite of the low wages paid in the Orient, rice is now grown in

the United States more cheaply than in Asia, because of our use of modern machinery. In Japan one man can plant, care for, and harvest only about one acre of rice. In Louisiana and Texas one man can raise eighty acres. Rice is a crop of some importance in the Po Valley of Italy, and less so in Spain and Greece, in all of which countries it is grown under irrigation.

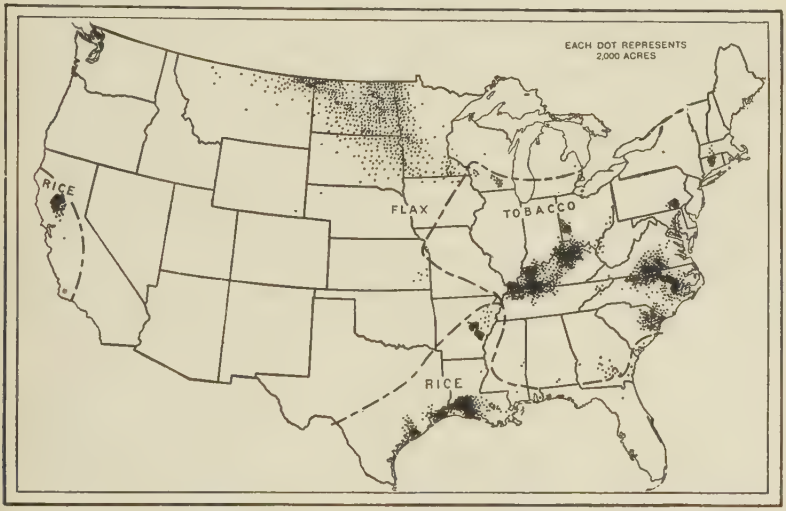

FIG. 35. Regions in the United States that produce rice, tobacco, and flax. (*U. S. Dept. Agr.*)

Buckwheat. — The buckwheat plant is not a cereal; but its seeds yield a kind of flour much liked by many Americans. Buckwheat is not widely grown and is relatively unimportant. Its chief advantage lies in its rapid growth and quick ripening. In certain northern states — particularly in parts of New York and Pennsylvania — a cold, wet spring sometimes delays the sowing of some of the farmer's crops until so late that they will not have time to mature before the autumn frosts come. On land intended for such crops the farmer often finds it advisable to sow a "catch crop" like buckwheat, which can be sown late and will mature quickly. Buckwheat is fed to farm animals, and

is also ground into buckwheat flour which is used in making griddle cakes.

The Grain Sorghums. — Into Kansas, Oklahoma, Texas, California, and a few other states have been introduced certain drought-resisting plants belonging to the sorghum family. These are known as *kafir corn*, *milo maize*, and by other names, or merely as *sorghums*. They are natives of the dry lands of Africa, and, like many of our newer crops, have been introduced into parts of the United States where the usual crops do not grow well on account of insufficient moisture. These sorghums grow as tall as corn, bear a heavy head of grain, and, like corn stalks, are also used as forage for cattle. Their peculiar value lies in their ability to grow vigorously in regions of light rainfall. The crop has had a rapid extension in the Southwest, where several million acres are devoted to it. The grain sorghums in the United States are already yielding much above a hundred million dollars a year on lands that previously raised almost nothing of value.

Summary

1. Different parts of plants are used for food, but the most nutritious parts are the seeds in which the parent plant has stored up food for the future use of the young plant.

2. Wheat of over a thousand varieties forms the leading foodstuff of the human race. It is grown in every country of the temperate zone, but Europe grows more than any other continent.

3. The great wheat lands of the world are in regions (*a*) of mild to cool temperature; (*b*) of moderate to light rainfall; (*c*) on plains with clay-loam soils; (*d*) provided with at least reasonably good transportation.

4. In the United States the Wheat Belt moved steadily westward with the movement of population, and now occupies the western plains, especially from Kansas to North Dakota.

5. The wheat-exporting countries ship wheat great distances. The daily price is determined by the crop outlook in all wheat-raising countries. Highly efficient means of handling and mar-

keting the crop have been devised. Wheat and flour are two of the leading commodities of world commerce.

6. Flour mills are still widely distributed through the northern states, but a few cities — Minneapolis in particular — have become outstanding centers of flour milling.

7. The United States has long been either the leading wheat exporter or one of the two leaders, but our increasing home demand will gradually change this condition as the years pass.

8. Corn — the leading crop grown in the United States — reaches 3,000,000,000 bushels in a good year. Most of it is fed to farm animals.

9. Corn grows best in the rich, level lands of the Central States, where the summers are hot and summer showers frequent. It also grows well in the South.

10. The oat crop of the world is larger than the wheat crop, but it is less important because oats are little used for human food.

11. Rye is the chief breadstuff used by about 200,000,000 people of Europe, especially the people of Germany, Russia, Poland, and adjacent countries.

12. Barley is suited to cold or dry lands with a short growing season. It matures quickly and is widely used as a breadstuff in parts of the Old World where wheat does not grow well.

13. Rice ranks next to wheat as a food for the human race. It is the all-important crop of China, Japan, India, and other monsoon countries. The United States now exports more than it imports.

Exercise

1. Suppose a wheat grower sows one bushel of seed wheat to the acre and that three fourths of the seeds grow; that four stalks of wheat spring from each seed that grows; and that each of these stalks bears a head containing forty grains of wheat. About how many bushels of wheat would such a crop yield to the acre? Since the average yield in the United States is only about fourteen bushels to the acre, what conclusions may you draw?

2. In years of good crops, the world has produced about 4,000,000,000 bushels of wheat. If we assume an average yield of sixteen bushels to the

acre, how many acres of land are required? A state like Kansas or Minnesota has a total land area of about 50,000,000 acres. The actual land required to raise the world's wheat crop would be how many times the area of Kansas or Minnesota?

In this connection it is well to keep in mind that in an average farming state only about half of the land is cultivated.

3. We may assume that the average wheat crop in the United States is 800,000,000 bushels, and that about one eighth of this is consumed within two hundred miles of where it grows; the remaining 700,000,000 bushels travel considerable distances to market. Assuming a carload to be 700 bushels, how many carloads of wheat must be moved considerable distances annually? Suppose these cars were made up into trains of fifty cars each, and that the trains passed a given point at the rate of one every ten minutes; how long (in hours and in days) would it take the entire 700,000,000 bushels to pass this point?

4. The following estimates are based upon actual costs of transportation, but are only rough averages. They show something of the cost of transporting our annual wheat crop to market.

800,000,000 bu. hauled from farm to R. R. station	at 8 cents a bushel	= ?
100,000,000 bu. hauled 200 miles by R. R.	at 8 cents a bushel	= ?
300,000,000 bu. hauled 1,000 miles by R. R.	at 12 cents a bushel	= ?
200,000,000 bu. hauled 1,500 miles by R. R.	at 16 cents a bushel	= ?
200,000,000 bu. taken to Europe	at 28 cents a bushel	= ?
Total		?

CHAPTER IV

VEGETABLES, FRUITS, SUGAR, AND TOBACCO

Vegetables as Foods. — Fresh vegetables are an important element in man's diet for a reason just the opposite of that which makes the grains especially valuable. Meat and grains are concentrated forms of food, but vegetables are somewhat coarse and bulky, and this quality makes them desirable in combination with the more concentrated foods in making up a well-balanced diet. In the case of vegetables like lettuce, cabbage, celery, and asparagus, we eat the stems or leaves. In the case of beets, turnips, carrots, and sweet potatoes, we eat the fleshy roots; in the case of green peas, green corn, and string beans, we eat the unripe seeds, including in the last named vegetable the fleshy pod also; while in the case of tomatoes, melons, squashes, and pumpkins, we use the fleshy fruit which incloses the seeds.

Vegetables and fruits contain *vitamins*, about which relatively little is yet known except that they are essential to the health of people. Vitamins are contained also in milk and in grain (in the outer portion of the kernels).

The Perishable Character of Vegetables. — Green vegetables are relished only when reasonably fresh, but most of them are perishable, and formerly had to be consumed near the place of production. Ventilator cars and cold-storage warehouses have now made it possible to ship vegetables long distances and to store them safely for a considerable period of time. These modern facilities are especially necessary in handling the "out of season" vegetables and fruits which are sent to northern markets from the South. The general use of ventilator cars has greatly extended the market for green vegetables, and has much increased their use. For example, some 12,000 carloads of celery from California are shipped annually to various parts of the United

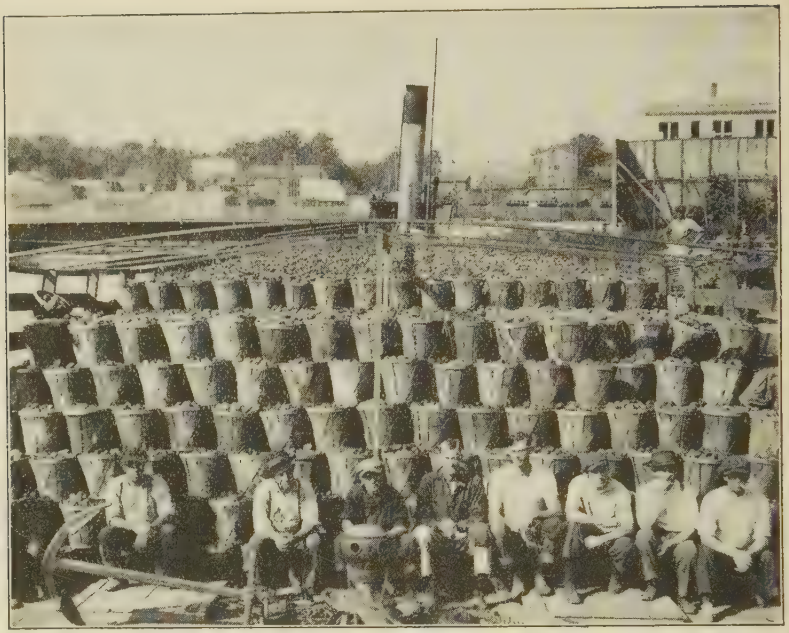

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FIG. 36. A boatload of tomatoes from New Jersey on their way to a canning factory. Tomatoes are one of the most excellent sources of vitamins.

States; and about 16,000 carloads of strawberries are shipped northward from Mississippi each season.

Market Gardening and Truck Farming. — Market gardening is an industry conducted mainly in the vicinity of large cities, while truck farming may be carried on at some distance from the markets to which the products are shipped. The market gardener lives near the city, and raises a variety of vegetables which he sends or takes to town almost daily; but the truck farmer is more likely to raise large quantities of one kind of vegetables or of a few kinds, — for example, tomatoes or melons or onions, — and to ship them in large lots, perhaps in carload lots. Both industries are intensive forms of agriculture or horticulture and demand special types of soil, a large amount of labor, and good

transportation; to be profitable they must yield a very large return in proportion to the amount of land used. Good truck land near a city is commonly worth upwards of a thousand dollars an acre, and each acre may yield a thousand dollars' worth of crops or more each year. The eastern coastal plain of the United States from Long Island to North Carolina is our greatest gardening and truck-farming region because of the warm, mellow soil, the good transportation facilities both by coasting steamers and by rail, and the many eastern cities which require great quantities of fresh vegetables.

Potatoes

Importance as a Food. — The potato, in the extent of its use as a food, is second only to wheat and rice. It is called a *tuber*, that is, a fleshy underground stem. The potato is a native of South America, where a species of very small potatoes was found in use among the Indians when the Europeans reached that continent four hundred years ago. The value of the potato as a food crop lies in its remarkable ability to store up starch, one of the chief kinds of human food. Its outstanding service to man lies in the quantity of food that an acre of potatoes is capable of yielding. Two hundred bushels to the acre is a common yield, and 400 bushels or even more are raised (Fig. 37). No other crop, except possibly corn, yields man so much food in proportion to the area of land that is used. It is therefore peculiarly suited to countries of a dense population where large numbers of people must use inexpensive foods, as is the case in parts of Russia, Poland, and Germany. It is estimated that a fourth of the human race eat potatoes every day.

Climate and Soil. — The potato grows well in a variety of soils and in a variety of climates. It is at its best, however, in a climate of cool, moderately moist summers such as that of central Europe and northern United States. In the South it is a winter or spring crop, dug before the hot weather comes on. Potatoes produce the best quality and largest quantity in well drained

FIG. 37. Harvesting an enormous crop of potatoes (720 baskets per acre) in New Jersey. The high prices obtainable in the great cities near by enable the farmers to fertilize the land heavily.

sand loams or gravel loams which have a good supply of humus. The heavier clay soils suited to grasses and grains usually produce poor potatoes. In both Europe and North America, the leading potato soils are glacial loams which have a high proportion of sand or gravel and therefore are likely to be well drained.

Production in the United States. — About half the potatoes grown in the United States come from six states, all but one of which touch the Great Lakes. In some years New York leads, and in other years the leading state is Wisconsin or Michigan; the other three states are Maine, Pennsylvania, and Minnesota. Long Island, central New Jersey, and Aroostook County in northern Maine are regions of very large production. However,

potatoes are grown to some extent in every state and in almost every county in the United States (Fig. 38). The quantity produced and the price fluctuate greatly from year to year, depending upon weather conditions and upon the acreage which is planted. A year of unusually high prices is quite sure to be followed the next season by large planting.

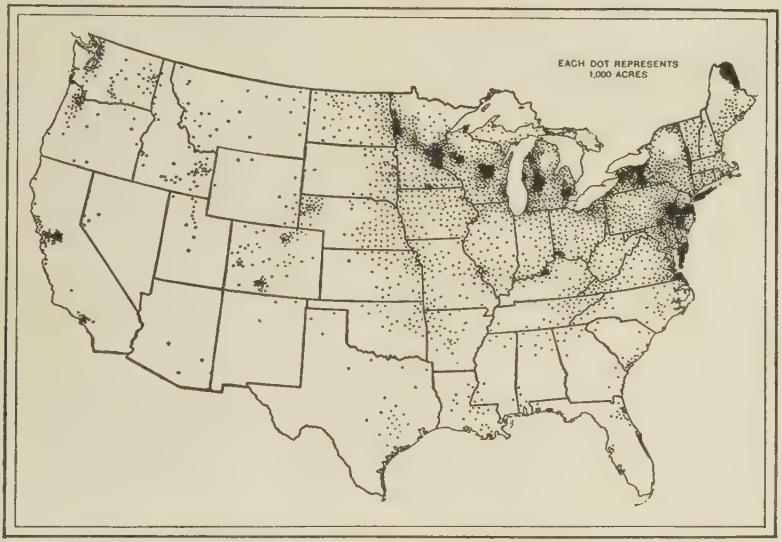


Fig. 38. Potato-producing regions. (*U. S. Dept. Agr.*)

Production in Europe. — Europe produces about 90 per cent of the world's potato crop; Germany is the leading country, with Russia second (Fig. 39). Even France, though smaller than Texas, raises more potatoes than the entire United States. The great plains of Germany, central Russia, Poland, and southern Sweden have sandy glacial soils, particularly suited to the growing of potatoes. The enormous production in Europe is due to two main causes: (1) the large population, including millions of people who must use the less expensive foods, and (2) the extensive use of potatoes as feed for farm animals, especially hogs and cattle; the potatoes in part take the place filled by corn in

FIG. 39. Potato-growing regions of Europe and the United States. Each dot represents 25,000 acres. (*U. S. Dept. Agr.*)

the United States as cattle feed. In Europe, potatoes are also used extensively in the production of starch, potato flour, and alcohol.

Sweet Potatoes. — Sweet potatoes are grown mostly in our southern states, where the growing season is 175 days or more long, but the sweet potato belt also extends northward into New Jersey. The perishable character of sweet potatoes prevents their being stored for any length of time, except in cold storage, and requires that they be marketed as soon as possible after being dug from the ground. The annual production in the United States is about one fourth that of white or Irish potatoes.

LEGUMES AND PEANUTS

Beans. — Beans belong to a plant group known as the *legumes*, whose special value lies in the large amount of proteins or nitrogenous food as well as carbohydrates which they contain. Thus, beans (and peas also) may be used as a substitute for meat, and are much less expensive, and on this account they are much used in countries where the majority of the people cannot afford meat or prefer not to eat it. This applies to a large part of the population of countries like Mexico, Brazil, and China. Baked

beans are a very common article of food in the United States. Most of the bean crop in this country is grown in limited areas of three states — Michigan, New York, and California (Fig. 40).

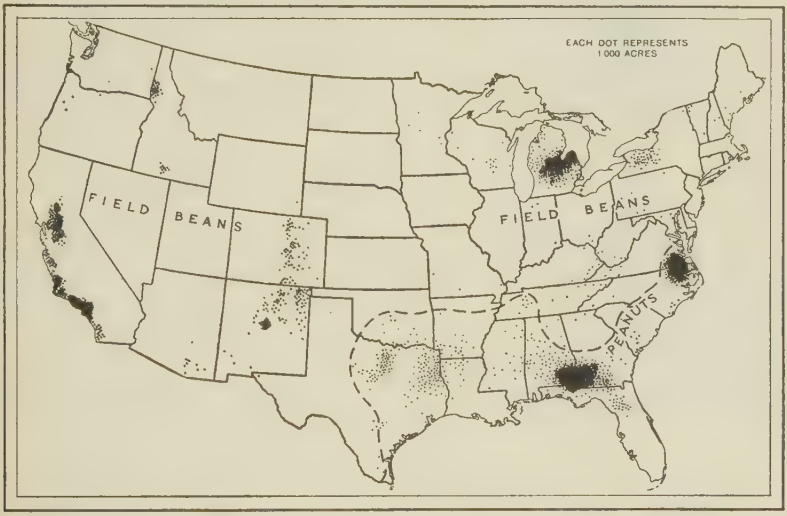


FIG. 40. Regions of the United States producing field beans and peanuts. (*U. S. Dept. Agr.*)

Soy Beans. — Soy beans are unlike the ordinary beans referred to above in that they are also rich in oil, which may be pressed out from the crushed beans. The native home of soy beans is the Orient, especially north China, from which they were introduced into the United States. They are now grown increasingly in this country, especially in the Cotton Belt (Fig. 9), where their fertilizing effect upon the soil benefits the cotton crop. North Carolina alone produces more than a million bushels a year.

The legumes, including clover, alfalfa, beans, and peas, are of special importance to agriculture because certain bacteria live in the roots of the legumes, and take nitrogen from the air. The nitrogen accumulates in nodules on the roots (Fig. 41); from these it is taken by the plant, and it also passes into the soil for

the use of future crops. Since nitrogen is absolutely essential to plant growth, the legumes are proving to be an important fertilizing agency in enriching or restoring agricultural lands. For this reason clover, alfalfa, cow peas, and soy beans play an important part in improving soils.

FIG. 41. Root of soy bean, showing nodules containing millions of nitrogen-fixing bacteria.

Peanuts. — Peanuts are a crop of growing importance in the United States and in various other parts of the world, and especially in China, from which we import large quantities. The French colony of Senegal in West Africa exports several million bushels yearly. In the southern United States about 1,500,000 acres are devoted to this crop each year (Fig. 40). Peanuts are rich in carbohydrates, protein, and oil; they are a nourishing food, and like the soy bean are an important source of vegetable oil.

FRUITS

What are Fruits? — All seed-bearing plants yield fruits of some sort, for the seeds and the structure which contains the seeds are the fruit of the plant. In the majority of plants this fruit is not edible, or at least is not pleasant to eat. A relatively small number of plants attach their seeds to, or inclose them in, a juicy pulp which is pleasing to the taste. By selection, cultivation, and breeding, certain fruits have been brought to a state of unusual excellence.

The actual food content of most fruits is small, but their flavor and sweetness, and the pleasure that we get from eating them, make the fruits the most delightful of foods. A few fruits such as the banana, breadfruit, and date are substantial foods, and form an important part of the diet of millions of people. A great

many of the most delicious fruits are scarcely known outside the regions where they grow, for they are too perishable to ship.

Apples. — Of the six principal orchard fruits grown in the United States (the apple, peach, pear, plum, prune, and cherry), the apple exceeds, in the annual value of the crop, all of the others combined. Apples are hardy; they keep well, ship well, and are always in demand. Our exportation of apples averages from 1,000,000 to 2,000,000 barrels a year. This fruit is grown in every state of the Union, but certain regions — usually for climatic reasons — have become noted for the excellence and abundance of their apples (Fig. 42). Some of these regions are (1) western New York, in the counties which border on Lake Ontario, (2) southern Michigan, (3) the uplands of Virginia, and (4) the Ozark region of Missouri and Arkansas. (5) In the Far West are many valleys where, under irrigation, great quantities of excellent apples are grown; they are carefully graded and packed, and are mostly shipped to eastern markets.

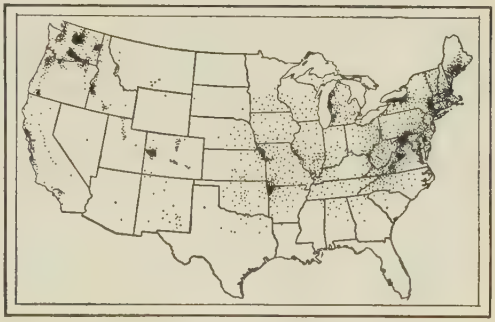


FIG. 42. Production of apples. Each dot represents 50,000 bushels. (*U. S. Dept. Agr.*)

Citrus Fruits. — Oranges, lemons, limes, and grapefruit are known as citrus fruits. They are subtropical and tropical in their habits, and, so far as the United States is concerned, they are practically all grown in southern California, Florida, and Arizona. They are sensitive to frost, and heavy losses to orange groves from this cause have occurred both in Florida and in California. Most of the American-grown lemons come from California, while Florida is the largest producer of grapefruit. In Europe oranges and lemons are grown in Spain and in Italy,

including the island of Sicily, and at times the United States imports lemons from these countries. California ships about 20,000,000 boxes of oranges a year.

FIG. 43. An irrigated orchard in Colorado.

Other Orchard Fruits and Grapes. — Peaches, pears, plums, and cherries are grown in almost all sections of the United States, but the commercial grape-raising regions are much more restricted. Over half of the nation's grapes are grown in California, while the second region in importance is the southern and eastern side of Lake Erie, where the modifying influence of the lake favorably affects the climate. The influence of the Great Lakes also accounts for the large fruit production of Michigan and southern Ontario. The eastern grapes are mostly sold fresh for immediate consumption.

Special Fruits and Nuts. — Certain fruits which were formerly grown only in the Old World have been introduced into the United States, especially into California, and are now being

marketed in increasing quantities. Olives, brought over from the Mediterranean lands, and figs, introduced from Asia Minor, are now grown in California with complete success; and African dates are grown in southern California and Arizona. Only small quantities of pineapples are raised in the United States, and these are grown mostly in southern Florida. We import fresh pineapples from Cuba and the Hawaiian Islands and great quantities of canned pineapple from the Hawaiian Islands. Almonds, walnuts, and pecans are now produced extensively in the United States, — the first two especially in California, and the pecans in the southern states, especially in Texas and Georgia. Our annual crop of walnuts alone amounts to $10,000,000, and over 90 per cent of them are grown in California.

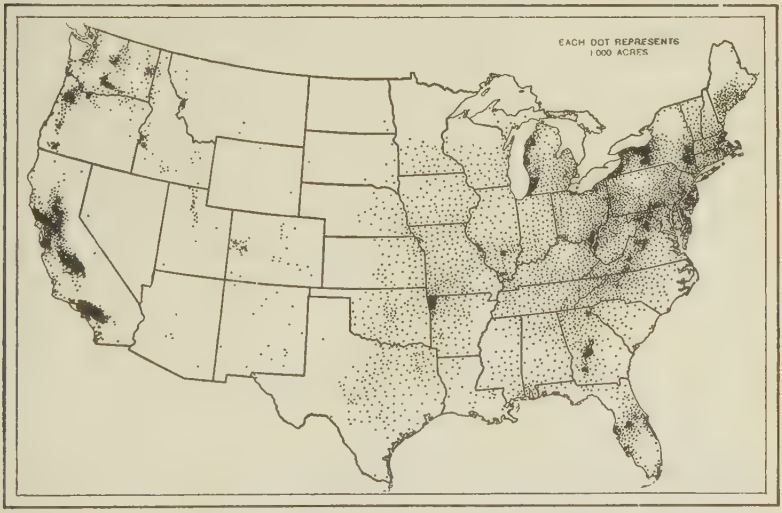


FIG. 44. Regions producing fruits and nuts. (*U. S. Dept. Agr.*)

Requirements of Successful Fruit Growing. — To grow fruit on a commercial scale and make it pay is a more difficult undertaking than is generally supposed. People who live in cities and see pictures of peach orchards and apple orchards loaded with fruit are likely to conclude that fruit trees just naturally grow and

bear fruit, and that man's part is to go to the orchard and pick the fruit and sell it to city dwellers at a handsome profit. But successful fruit growing is one of the most exacting of occupations, and more people fail at it than succeed; for it is one thing to grow the fruit and another thing to market it at a price which, year in and year out, nets an actual profit sufficient to pay expenses, pay a proper return on the money invested, and give the fruit grower's family fair wages for their labor.

In this industry as in many others, there are three major factors, any one of which, if unfavorable, can cause failure, while all three must be favorable to bring success. These three factors may be termed (1) the geographical factor, (2) the human factor, and (3) the marketing factor.

Under (1), the geographical factor, are included temperature, soil, exposure to the sun, frost danger, water supply, air drainage, and soil drainage, all of which taken together may be termed the *natural conditions*. If on certain land *any single one* of these natural conditions is positively unfavorable and cannot be remedied, the growing of fruit there will not succeed. (2) The human factor is the fruit grower himself. The industry demands a high order of intelligence, constant study, watchfulness, painstaking care, patience, and ability to learn by mistakes. The man who possesses *all* the qualities is likely to succeed, yet he is by no means sure of succeeding unless factors (1) and (3) are also favorable. (3) Assume that an intelligent and competent fruit grower has an orchard that is ideally situated on suitable land and that this orchard begins to bear large quantities of fine fruit. His neighbors also have plenty of fruit. He must find a market for his product in some region that does not produce so much fruit as it consumes. But the amount of fruit that people will consume depends largely upon its cost. If it costs too much, they buy but little. The fruit growers therefore can sell their fruit only in case the cost to the consumers is fairly low. And here enter the cost of pruning and spraying the trees, picking the fruit, grading it, packing it, hauling it to the railroad, transporting it, storing it, paying the middlemen's profits, and

delivering it to the consumer. The cost of transportation is one of the most important factors, and distance is a large element in cost of transportation.

How the Western Fruit is Handled and Marketed. — (1) Most of the far western fruit growers are organized in associations whose officers and directors work constantly for the betterment of the industry.

(2) All fruit marketed by the association is graded, packed, handled, and inspected according to the rules of the association, and its high quality is maintained, so that buyers may have absolute confidence in the association's brand or trade name.

(3) The association or "exchange" attends to the shipping of the fruit, assembles it in carload or trainload lots, directs its movements to various eastern cities, and seeks to prevent an oversupply reaching any one section or city.

(4) Trains of special ventilator cars, carrying ice if necessary, and traveling almost at express speed, make the journey in a minimum of time, and deliver the fruit at its destination in excellent condition.

(5) In all important cities are cold-storage warehouses in which the fruit may be kept in good condition until the market will take it.

(6) In the important cities, the fruit growers' associations have agents who attend to the selling of the fruit and keep the growers informed of the condition of the market.

(7) Campaigns of skillful and attractive advertising are conducted.

(8) Through the organized efforts of the growers, freight rates are kept more reasonable than would otherwise be possible.

Fruit Drying in California. — California leads all the states in fruit production because of its particularly favorable climate. The greater part of the fruit is grown on irrigated land. In the southern half of the Valley of California the summers are dry and sunny, and frosts are rare. Moreover, the dryness of the air is ideal for drying the fruit. Enormous quantities of raisin grapes are spread out on trays in the sunshine, and converted

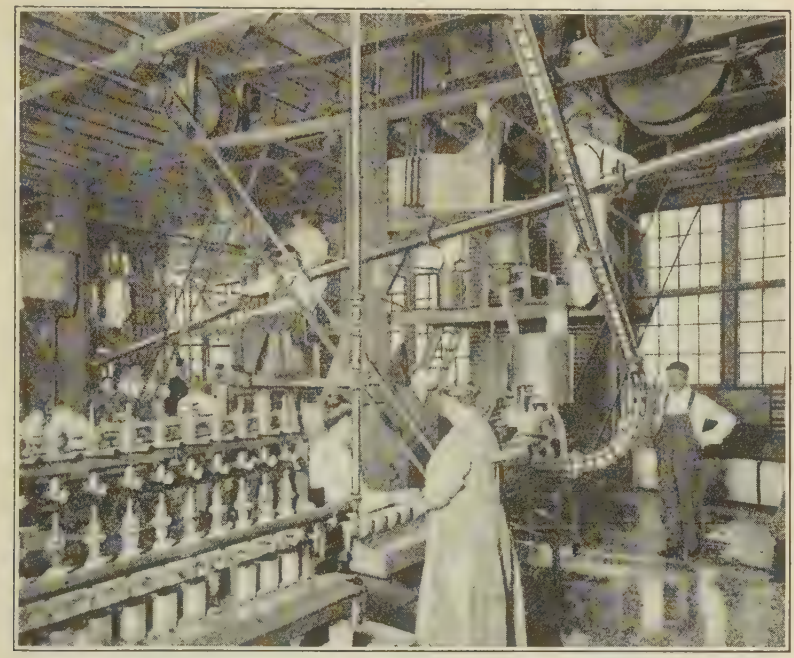
into raisins. Practically all the raisins used in the United States, and large quantities for export, come from these California vineyards. The same is true of our dried prunes, dried apricots, and dried peaches. In the total, the fruit-drying industry of California yields products valued at about $100,000,000 a year. Some 15,000 carloads of dried fruits are shipped from California annually. In no other state of the Union are the industries, prosperity, and growth of the state so directly and so largely the result of its special type of climate as is the case in California.

Small Fruits. — Berries of many kinds — strawberries, raspberries, blackberries, blueberries, loganberries, cranberries, and others — are grown on a commercial scale in various parts of the United States, but especially in the more densely populated eastern third of the country. Most berries are so perishable that they are not shipped long distances, although strawberries and cranberries are a partial exception to this rule. For example about 10,000,000 bushels of strawberries are marketed yearly in the United States and Canada. Ninety per cent of the nation's cranberries come from Massachusetts and New Jersey.

The Fruit and Vegetable Canning Industry. — The preserving of vegetables and fruits in air-tight tin cans has become a vast industry (Fig. 45). It has grown almost past belief, already exceeding 1,500,000,000 cans a year, and moving steadily toward 2,000,000,000. Four vegetables — tomatoes, corn, peas, and beans — total over 1,000,000,000 cans a year, and peaches total nearly 1,000,000 cans a year. Vegetable canning is widely distributed among the states, especially those along the north Atlantic and the Great Lakes. The very marked specialization of certain sections in certain vegetables is noticeable. For example, Wisconsin canneries put up over half of the canned peas used in the United States.

Sugar

Sources. — Many fruits and vegetables store up sugar, but most of the sugar which enters into trade comes from either



Ewing Galloway

FIG. 45. Interior of a modern canning factory. The empty cans enter the filling machine from the gravity conveyer, and are capped and sealed in the machine at the left of the picture.

sugar beets or sugar cane. These two plants in particular have acquired a sugar-storing habit; man discovered this habit, and by selecting special varieties and breeding them by scientific methods, he has developed varieties which store much more sugar than their ancestors did. For centuries the human race depended mainly on cane for its sugar, but during the long Napoleonic wars (1793–1815) experiments with the beet were conducted, especially in France, and later in Germany, and these led to the extensive cultivation of the sugar beet in Europe. By 1913 as much of the world's sugar was obtained from beets as from cane.

A considerable quantity of maple sugar has been made in the past, and some still is made, from the sap of the sugar maple tree which grows in the northern states from New England westward to Wisconsin. The sorghum, or Chinese cane, grown somewhat in the United States, is also a sugar-storing plant. Its sugar does not crystallize well and is mainly used in the form of molasses. Corn sirup is made from Indian corn or maize, though its sweetening power is less than that of cane sugar or beet sugar.

The Great Increase in the Use of Sugar. — Sugar has a genuine food value in addition to the pleasure that its sweetness gives. The higher the standard of living of a people, the more

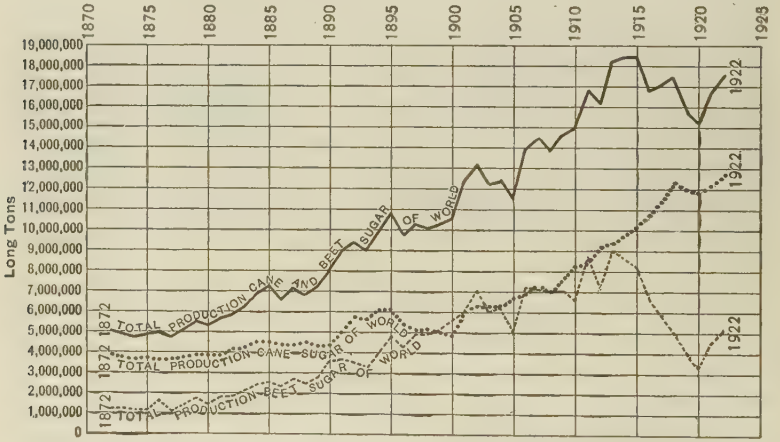


FIG. 46. World's annual production of sugar. (*After Willett & Gray.*)

sugar they use. People of backward countries like Turkey consume much less sugar per capita than do those of the advanced countries like England. Americans consumed only twenty pounds of sugar per capita in 1860, but now they consume ninety pounds or more per capita annually, and the amount is steadily increasing. Of all the things that we import, sugar is first in total value, and the greater part of it comes from Cuba.

The world's production of sugar increased nearly 1000 per cent between 1860 and 1914.

Conditions of Beet Sugar Production. — The beet is the great sugar producer of the temperate zone. The United States has a

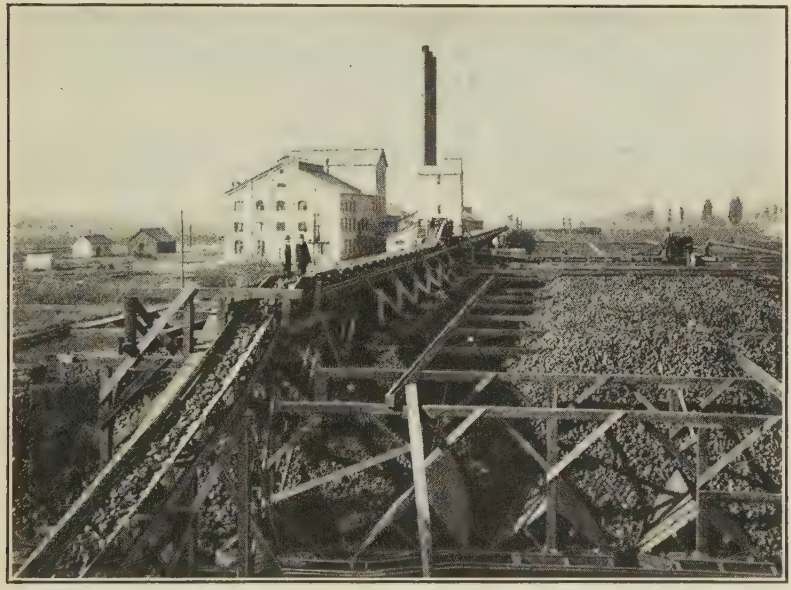


FIG. 47. Beet sugar mill in Utah. Great storage bins filled with sugar beets at the right. Conveyer at the left for carrying the beets to the mill.

large area of land suited to the growing of sugar beets. The company owning a sugar mill contracts in advance with farmers to raise the beets, for the mill must be assured of a supply of beets, and the farmers wish to be sure of a sale for their beets at a fair price. The mill owners supply the farmers with select seed, instruct them if necessary in the methods of growing and harvesting the beets, and in all particulars maintain close relations with them. Only thus can the industry succeed.

Beet Sugar Production in the United States. — Few crops require more "down on your knees" labor than do sugar beets,

and American labor costs and labor scarcity have held back the production of this crop as compared with its growth in the densely populated countries of Europe where labor has been abundant and cheap. In the United States the greater part of the sugar beets are grown in the West under irrigation. Of about ninety beet sugar factories in the United States, two thirds are supplied with beets from irrigated lands (Fig. 126). Colorado is the leading producer, and Michigan, in the humid belt, is second. Utah and California are the other two states that produce large crops of sugar beets. The manufacture of beet sugar in the United States grew rapidly between 1870 and 1916, in the latter year reaching over 800,000 tons, which is about one sixth of the amount of sugar that we consume annually. In the continental United States we produce about three times as much beet sugar as cane sugar, and the quantity of each produced within the country is not increasing (1920–1923).

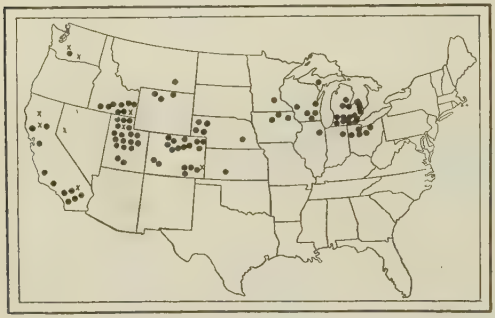


FIG. 48. Beet sugar mills in the United States. (*U. S. Dept. Agr.*)

Beet Sugar Production in Europe. — Beet sugar is produced in nearly every European country, but the industry suffered a serious setback during the World War, and only slowly recovered. Before that war, Germany, France, Austria-Hungary, and Russia were the largest growers of sugar beets, and Europe as a whole was supplying about half the sugar used in the world (Fig. 46).

Cane Sugar Production in the United States. — Sugar cane is a tropical and subtropical plant, resembling corn when growing. In the tropics it will grow year after year with only occasional replanting. The cane is cut once each year, and a new crop springs up from the old rootstocks. In the warm parts of the

temperate zone where frost occurs, as in Louisiana, the cane is replanted each year. Pieces of cane several inches long, and containing at least one joint, are planted in the ground, and from the joints new plants shoot up. The quality and quantity of cane that can be produced depends upon the soil and climate in which it grows: there must be (1) no frost for at least $7\frac{1}{2}$ or 8 months; (2) much sunshine; (3) plenty of rain in frequent showers; (4) a deep, rich soil; and (5) abundance of warmth.

Small quantities of cane are grown in all our southernmost states, but only in Louisiana is the crop really important. Here,

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FIG. 49. Cutting sugar cane in Louisiana. An acre produces about 15 tons of cane, which yields an average of 2000 pounds of sugar.

in the moist black soil of the Mississippi delta lands, sugar is the most valuable crop, and from 200,000 to 300,000 tons are produced yearly. This, however, is only a small fraction of what the people of the United States consume.

Cane Sugar in Hawaii, Porto Rico, and the Philippines. — In our mid-Pacific Hawaiian Islands are some of the finest sugar plantations in the world: there much of the cane is raised under irrigation. Fertilizers are used freely, and the yield of sugar is larger than in any other country, averaging nearly 10,000 pounds to the acre. From these small islands the United States receives

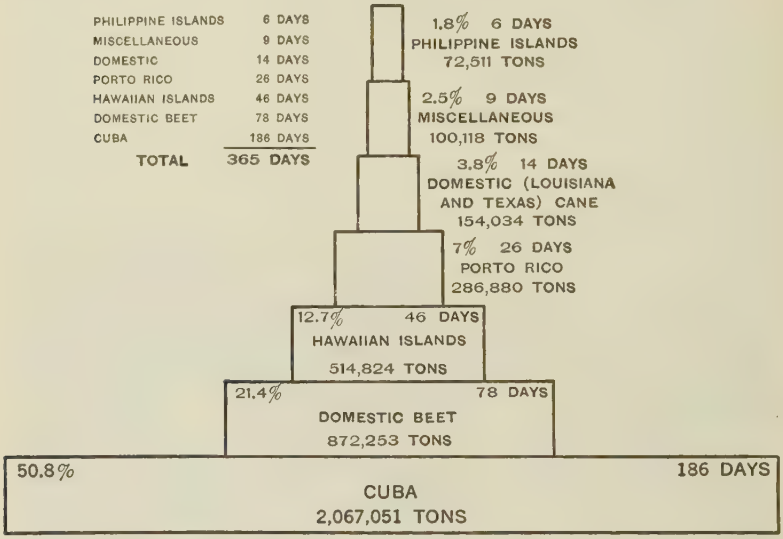

FIG. 50. Sources of sugar consumed in the United States in 1919; proportion supplied by each source, and number of days per year this would supply the needs of the United States. (*American Sugar Bulletin.*) Porto Rico's proportion is now larger than is shown above.

more than 500,000 tons of sugar each year. Part of it comes to refineries in California, but still more comes through the Panama Canal to refineries on our eastern seaboard.

The island of Porto Rico in the West Indies has become almost as large a producer of cane sugar as Hawaii, also sending us nearly 500,000 tons in a favorable year. Sugar is also a crop of considerable importance in the Philippines, but the production is less than half that of Hawaii or Porto Rico.

Cane Sugar in Other Lands. — In recent years Cuba has become the leading producer of cane sugar, and nearly all the Cuban crop comes to the United States to be refined. All the other countries of tropical America also grow cane sugar, and many of them export it, but not in large quantities. In the Old World, India is the largest producer, but the great population of that country consumes practically all of the sugar grown there. The island of Java is one of the leading producers of cane sugar, and is one of the chief exporters, though as a rule little Java sugar reaches the United States. Of about 12,000,000 tons of cane sugar produced annually in the world, Cuba supplies a third and British India a quarter; the United States consumes 40 per cent of the total. In normal times the people of the world spend between $2,000,000,000 and $3,000,000,000 a year for sugar; it is one of the chief items of the world's trade.

Sugar Refining in the United States. — Beet sugar is extracted from the beets and made into refined sugar in the same factory, and the factory must be located in the same general region that raises the beets. Hence the beet sugar factories of the United States are located in the interior of the country.

In the case of cane sugar, the procedure is different. Cane sugar is grown mostly in tropical lands, and these are not so well suited to manufacturing as are the temperate regions. The cane is ground and raw sugar is made in mills near the cane fields, but the raw sugar is not refined there. In the United States, the great sugar refineries are mainly in the Atlantic coast cities, Boston, New York, Philadelphia, and Baltimore, and also in New Orleans and San Francisco. Owing to the great weight of the sugar that must be handled, these refineries are built at the water's edge, with wharves where ships unload their cargoes of raw sugar. (See Frontispiece, which shows such a refinery.) So highly efficient is the manufacturing and marketing of sugar, and so skillfully and economically are all the processes performed, that the refined sugar is ordinarily delivered to our homes at less than ten cents a pound.

Tobacco

The tobacco plant is a native of America and was entirely unknown to the Old World before the voyages of Columbus. Its use has spread over the world, and it has become one of the large items of international commerce. It grows in any part of the tropics and even in such cool parts of the temperate zone as Wisconsin and Connecticut. There is scarcely any plant known to commerce that has such a great variety of grades and types, of which there are actually hundreds fully recognized by the trade, and commanding a range of prices from a few cents to $20 or $25 a pound. Climate and soil (especially soil) have much to do with the character and quality of the tobacco. Some kinds of leaf are best fitted for cigar fillers, some for binders, and some for wrappers. Other varieties are chiefly used for cigarettes, or for package smoking tobacco, or for any one of several other slightly different purposes. The United States is the largest producer of tobacco among the countries of the world, and Kentucky is the leading state, followed by North Carolina and Virginia (Fig. 35).

The growing of tobacco is peculiar in that its cultivation is not scattered widely over whole states but is usually concentrated in limited sections of a state, perhaps in two or three counties, as in the Connecticut Valley, in two counties of southeastern Pennsylvania, in small areas in Ohio, Tennessee, Maryland, and Wisconsin.

Tobacco is also raised in a great many other countries, including India, Russia, Hungary, Germany, Japan, the East Indies, Turkey, Cuba, Porto Rico, the Philippines, and Brazil. The United States is the largest exporter, but is also a large importer of special varieties.

Exercise

1. Why are fresh vegetables a desirable — almost an essential — part of man's diet?

2. Why, in the past, was it necessary to raise vegetables near the market in which they were to be sold?

3. Why is this no longer necessary?

4. Why, in the United States, is truck farming carried on more largely in the South than in the North?

5. Why is market gardening carried on more largely in the North than in the South?

6. Why has the Atlantic Coastal Plain of the United States become an especially important region for truck farming?

7. Why is garden farming a large industry on Long Island and in New Jersey?

8. Why are white potatoes grown mainly in the North and sweet potatoes mainly in the South?

9. Why do the countries of Central Europe raise far more potatoes than the United States?

10. Why do beans form a desirable item in the food of certain countries?

11. Why are soy beans becoming a highly valuable commercial product?

12. Why are apples the most generally used fruit in the United States?

13. Why is it desirable that fruit be grown in as many parts of the country as possible?

14. Why is the fruit grown on irrigated lands in a dry climate likely to be more perfectly colored than fruit grown in a rainy climate?

15. Why is it possible to transport apples in perfect condition a distance of several thousand miles?

16. Why are western apples able to compete successfully with eastern apples even in the eastern markets?

17. Why have citrus-fruit growers found it desirable or necessary to market their fruits through fruit growers' associations?

18. Why is it more difficult to make a success of growing fruit than of ordinary farming?

19. Why is the southern half of California well suited to the preparation of dried fruits? What fruits?

20. Why is the practice of canning and drying fruits a benefit both to fruit growers and to the public?

21. Why must the farmers who raise sugar beets and the owners of the sugar mills work in close coöperation?

22. Why does the United States import a great deal of sugar from Cuba but not very much from Java?

23. Why are cane-sugar refineries at the water's edge in seaport cities?

24. Why does Europe usually find it unnecessary to import very much cane sugar?

CHAPTER V

THE FIBER-YIELDING PLANTS

The Ever-Increasing Demand for Fiber Products. — Our modern manner of life calls for an endless variety of things — things that are rigid and strong, for which we use wood, stone, or steel; things that are transparent, like glass; elastic, like rubber; tough, like leather; light, like cork; and so on through a long list. Among the foremost of these requirements is the need of suitable material with which to clothe the body without hampering its movements; something flexible, durable, and washable. Early man saw how the animals were clothed, and he robbed them of their skins to clothe his own body. So long as men were few, this plan sufficed, but the time came when men had to find other materials for their clothing. The next step was to use the hairy or woolly fleece of certain animals, and gradually the art of spinning and weaving was developed. But again there came a time when man felt the need of still other materials for his clothing, and he found that certain plants grew fibers which could be spun into threads, and the threads woven into cloth. Gradually man's wants have multiplied, and he no longer desires fabrics for his clothing alone, but he wants them for carpets and rugs, for hangings, for wrappings, for bagging, for bedding, for bookbinding, and for a host of other purposes. His commerce calls for hundreds of millions of bags to carry coffee, flour, grain, cement, sugar, salt, and many other products; and the very growth of this commerce depends in a measure upon his being able to find fiber plants that produce strong, cheap fibers in practically unlimited quantities. Among all the plants, he has found six that supply most of his requirements — cotton, flax, hemp, jute, manila, and sisal; there are also a number of other less used ones.

Cotton

The World-Wide Use of Cotton. — Cotton is the most used and most useful of all textile fibers, because it is fine, soft, durable, and cheap. For certain special uses, silk, linen, or wool may be more desirable, but they are more expensive. Cotton makes almost the only clothing used by half the people of the earth, and the larger part of the textile materials used by the other half. Cotton and cotton goods form one of the principal groups of commodities in the world's trade. Raw cotton is the leading export of the leading exporting nation — the United States; it is also the largest import of the greatest importing nation — Great Britain; and cotton goods are the most important export of that country. It may almost be said that the industrial life of Great Britain centers around cotton manufacturing, and its commercial life around the trade in cotton and cotton goods.

History of Cotton. — Cotton was spun and woven in the Old World before the dawn of written history; no one knows when the human family first began to use it. Shortly after the Europeans discovered America, they found it in use among Indian tribes; but before the year 1793 it was an expensive luxury, costing more than wool, and more than silk now costs. Up to that date cotton fiber had to be separated from the seeds by hand, a very laborious and time-consuming process; it required about a day's labor to separate the seed from a pound of cotton. In 1793 Eli Whitney, an American, invented the cotton gin, a machine that quickly and easily separates the cotton seeds from the fiber. Thereupon cotton dropped rapidly in price, and has now become the material of the poor man's clothing the world over.

Climate and Soil Requirements. — Cotton is grown in the tropics, and in the warmer parts of the temperate zones. It is a shrub or bush growing to a height of two to four feet, or a little higher. In the tropics it is a perennial; that is, it grows year after year without replanting, but the tropical plants do not

yield so well as do the plants that are grown in the warm temperate zone where the seed is planted each year. Cotton requires a long growing season free from frost — at least six and one half or seven months. The plant is very particular about climate, so much so that in spite of continuous efforts to extend its cultivation, it is profitably grown on a large scale in only a few parts of the world. Not only does the plant require a long growing season, but it requires a particular type of rainfall — abundant in spring and early summer, but lighter in the late summer and autumn. The best type of summer climate is the sunshine-and-shower type with plenty of warm sunshine, especially in June and July, but the autumn must be fairly dry to permit picking. After the bolls open, the white cotton protrudes, and it is then easily stained and injured by rain.

The plant is less exacting in the matter of soil than it is in the matter of climate, but it produces its best crop in fine, rich, black soils such as alluvium and prairie soils. Up to date the only large region in the world which has been found to possess all the necessary conditions of soil, climate, labor supply, and transportation, is the southern part of the United States; and about 50 or 60 per cent of the world's crop is produced there.

How Cotton is Grown and Picked. — The ground is prepared for planting in different ways in different parts of the Cotton Belt. In early spring the seeds are planted in rows about three or four feet apart; soon after the young sprouts appear, they are thinned out with a hoe, and the weeds are kept down and the ground is kept loose by frequent cultivation. In midsummer the plants blossom profusely, and a cotton field is a beautiful sight. The blossoms develop into pods or bolls of cotton containing many seeds to which the fiber sticks tenaciously. As the bolls ripen they burst open, disclosing the fleecy white fiber. The bolls do not all ripen at the same time, and this requires that the field be picked three or four times. Machines for picking the cotton have been devised, but they are only partly successful, and most of the cotton is still picked by hand, by negroes — men, women, and children. A great deal of labor is required, for the average adult picks only about 100 pounds a day, and nearly two thirds of this by weight consists of seed. The white planters are mainly dependent upon colored labor, and the supply of labor determines how much

Ewing Galloway

FIG. 51. A cotton field and cotton mill in North Carolina. The cotton is gathered in sacks or in baskets as it is picked. In the cotton mill, the fiber is spun into thread and woven into cloth.

cotton can be grown. The production per acre varies greatly, but averages from 150 to 200 pounds of fiber.

Tenant Farming. — Most of the large cotton plantations of the old days have been divided up, and part of the land has been sold to smaller holders. Much cotton land is also rented to tenants, both colored and white, each of whom raises a few acres of cotton. One type of tenant is known as the "cropper" or "share cropper"; he raises cotton on the proprietor's land, and both parties share the proceeds of the crop; this is a very common practice throughout the Cotton Belt east of Texas.

The Dominating Place of Cotton in the South. — In no other large area of the United States is a single crop so dominant as cotton is in the South. In the Corn Belt and the two Wheat Belts (Fig. 9) neither corn nor wheat occupies as much as one third of the cropped land; but in the Cotton Belt cotton occupies as much land as all other crops combined. There are a number of reasons for this, but the chief ones are: (1) Cotton is nearly

always salable. (2) The cotton grower who has insufficient money to buy the needed fertilizer and carry him through the season can borrow money by pledging his cotton crop as security; he cannot do this so well in the case of any other crop, and a large proportion of the cotton growers need this sort of financial assistance. (3) The southern people have become accustomed to cotton, and hesitate to turn to other types of agriculture with which they are unfamiliar and for whose products convenient markets are lacking. There is no doubt that more diversified farming, in which a beginning has already been made, will greatly benefit the South.

Ravages of the Boll Weevil. — In 1892 the worst enemy the cotton plant ever had came into Texas from Mexico; it was the boll weevil, an insect that destroys the cotton boll (Fig. 52).

FIG. 52. Cotton boll weevil: larva, pupa, and beetle. The beetle is shown in two positions; the line between them indicates the life size.

Year by year the area infested by the boll weevil spread northward and eastward until now every cotton-growing state has it. Nothing has been found that will exterminate it, but means of holding it in check have been devised and, despite its ravages, the supply of cotton is kept up. When the weevil first invaded a region, the planters did not usually know how to combat it, and the cotton crop was largely ruined;[1] but gradually they have

[1] In a recent year the United States government estimated the value of the cotton picked at $772,000,000 and the value of that ruined by the weevil at $610,000,000 ("The Billion-Dollar Bandit").

learned how to hold it in check. The difficulty of fighting the weevil has led many southern farmers to grow other crops than cotton, to raise more live stock, and, by diversified farming, to get away from the dependence upon one crop. Thus in some districts the weevil has been a cause of increasing prosperity.

Kinds of Cotton. — The cotton trade recognizes certain types of cotton based upon the average length of the individual cotton fibers in the boll. These may be broadly grouped as *long-staple* and *short-staple* cottons, but there are subdivisions of each. In short-staple upland cotton the fiber or staple is less than $1\frac{1}{16}$ inches long; this is the usual kind of American cotton; it forms over 90 per cent of our entire crop. Long-staple upland cotton has a fiber about $1\frac{1}{4}$ inches long. American-Egyptian cotton, grown under irrigation in southern California and Arizona, has a staple $1\frac{1}{2}$ to $1\frac{3}{4}$ inches long; while sea-island cotton, formerly grown on islands off the coast of South Carolina and Georgia and afterwards on the mainland of southern Georgia and northern Florida, has a staple that reaches a length of two inches. The genuine sea-island cotton is very fine, strong, and silky, and commands a high price. Cotton grown in Egypt also has a long staple and sells for a higher price than most other cottons except the sea-island.

The Principal Cotton-Growing Regions of the United States. — It will be seen from Figure 53 that there are three parts of the

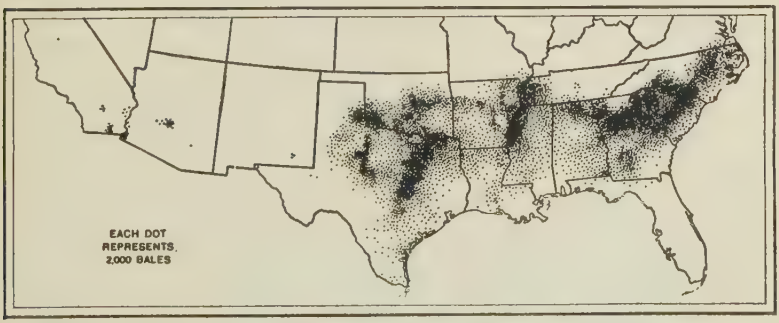

FIG. 53. Cotton-producing regions of the United States. (*U. S. Dept. Agr.*)

Cotton Belt where the production of cotton is heavier than elsewhere. These are (1) in a belt extending through the central parts of South Carolina and Georgia; (2) along the Mississippi and Yazoo "bottoms" in Tennessee, Arkansas, and Mississippi; and (3) in central Texas and Oklahoma. So much work is involved in the growing of cotton that the crop is especially stressed in those regions where the soil has proved to be particularly well suited to it. It is an illustration of the principle: "Find the crop best suited to all the conditions in a given region, and then make the most of it." Texas, on account of its great size, leads in cotton production; several states are rivals for second place (Fig. 54).

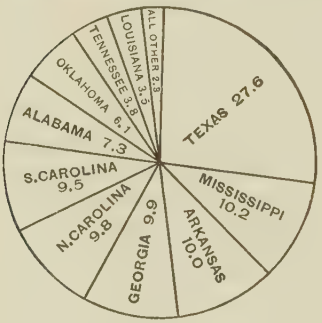

FIG. 54. Percentage of the United States cotton crop grown in each state in 1921. (*U. S. Census Bureau.*)

Ginning the Cotton. — It has already been stated that the seeds constitute nearly two thirds of the weight of cotton as it comes from the field. The seeds are removed by the machine known as the cotton gin; the cotton fiber, freed from seeds, is the *lint*, or raw cotton of commerce. Ginneries are found here and there, not many miles apart, throughout the region where cotton is extensively grown, and to these the cotton growers take their cotton for ginning. In some cases, the cotton grower owns his own ginnery. When the seed cotton has been ginned, the lint is pressed into bales (commonly weighing about 500 pounds), which are partly covered with coarse burlap or bagging, and bound or "tied" with light iron bands, or "ties" (Fig. 55). In case the cotton is to be shipped a long distance, it is economical to compress it further into smaller bales in order that it may occupy less space. This is usually done at the large market centers, where grading is also done. Nine standard grades of white cotton have been established by the United States government: and all American upland cotton is graded according to these standards, and the market price is fixed according to the grade. A small proportion of the cotton, including the sea-island, is compressed into smaller and lighter bales than the standard 500-pound bale.

FIG. 55. Baled cotton, Texas, ready for shipment or for compression into smaller bales.

Marketing the Cotton. — In nearly every village and town in the Cotton Belt are persons who buy cotton. Often the local merchants buy it or take it in exchange for goods or in the payment of debts; sometimes professional buyers representing large dealers or mill owners buy it; but in any case the cotton moves toward the great central markets such as Memphis, New Orleans, Houston, Galveston, or Savannah, or in some cases directly to the cotton mills (Fig. 56). At the market centers are special warehouses where the cotton may be graded, inspected, and stored, and from these centers it is shipped from time to time as the mills or the exporters demand it. Nearly half our annual crop is exported. The marketing of cotton is an enormous business, highly organized, and it involves many hundreds of millions of dollars in each year's transactions.

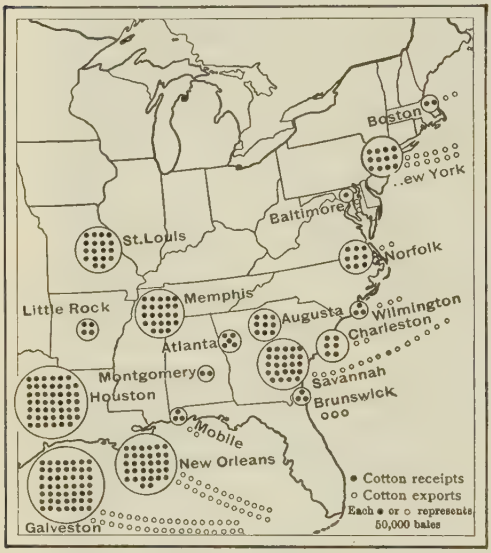

FIG. 56. Cotton markets and ports. Solid dots indicate receipts of cotton at principal markets; chains of small open circles indicate exports; 5-year average. (*Adapted from U. S. Dept. Agr.*)

Cottonseed Products. — Until near the end of the nineteenth century, cotton seed was regarded as refuse to be hauled away and dumped where it would do the least harm. Now the products of the American cotton seed every year sell for more than $100,000,000. At the oil mills the short, fuzzy cotton still sticking to the seed is removed by a special machine, and becomes the *linters* of which cotton-batting and cotton-felt are made. The

hulls are removed from the seeds and the seeds are crushed and put through powerful presses which extract from each ton about forty gallons of cottonseed oil, worth a dollar or more a gallon. This oil is used in making soaps, salad oil, and substitutes for butter and lard. The oil cake from which the oil has been pressed is a valuable cattle feed, and is sent all over the world to places where dairy cattle are raised. Even the hulls have some value as a feed.

Other Cotton-Growing Countries. — In comparatively few countries can all the conditions necessary for the profitable growing of cotton on a large scale be found. Four countries raise about 94 per cent of the world's cotton, as shown in Figure 57.

FIG. 57. Percentage of the world's cotton produced by each country; average for three years. The percentages vary rather widely from year to year.

Most of the remaining 6 per cent is grown in Russia, Brazil, Persia, and Peru. Most of the Egyptian and Peruvian crop is exported, but the greater part of that grown in Brazil, China, and India is used in those countries. Clearly, the United States dominates the raw cotton supply of the world; and the chief cotton-importing countries of the world, England, France, Germany, Italy, and Japan, view this situation with concern, for the cutting off of the supply of American cotton would pretty nearly ruin one of the greatest manufacturing industries in all of these countries. This is particularly true of England, whose industrial life centers around the cotton industry. During the Civil War in the United States (1861-1864), cotton exportation from the South practically ceased; many English cotton mills, which depended mainly upon American cotton, had to close down, and thousands of workmen's families suffered severely.

Cotton Manufacturing in the United States. — Cotton manufacturing is largely confined to the region east of the Appalachians, and it centers in two distinct regions. The older of these is in New England, and the other is in the Piedmont region of Virginia, the Carolinas, Georgia, and Alabama (Fig. 58). In

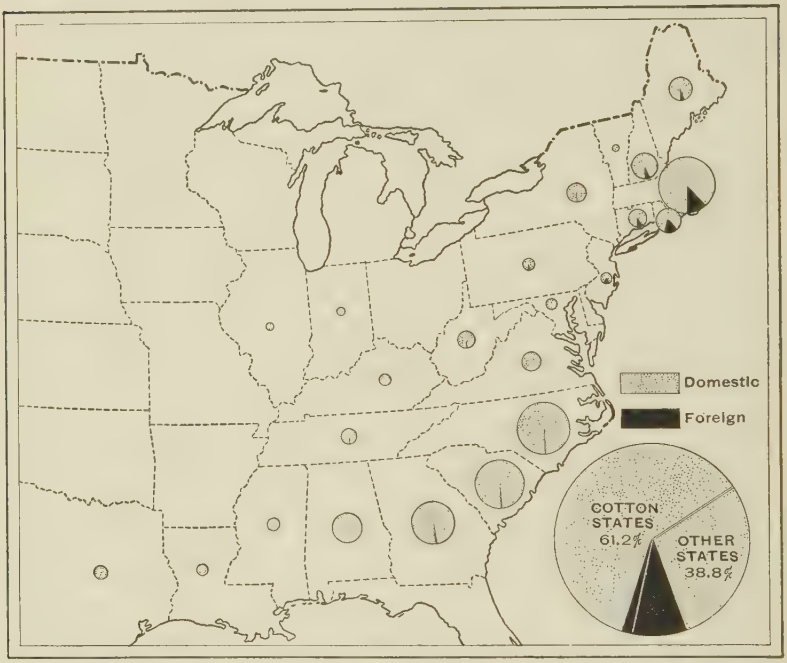

Fig. 58. Comparative amounts of cotton consumed in each state. Most of the imported cotton is taken by the New England states. (*U. S. Dept. Agr.*)

recent years the southern mills have gained rapidly on the northern mills, and they now use more raw cotton than the northern mills. The latter, however, make finer and more expensive fabrics, and the total value of their product is greater than that of the southern mills. In both North and South, water power has been a large factor in locating the cotton mills. The northern manufacturers have the advantage of longer experience, an

earlier start, and possibly somewhat superior labor. The southern mills are nearer the cotton fields, and the cost of living and of operation is a little lower. The United States uses more raw cotton in its mills than any other country, but England has the greater number of spindles, and the annual value of English cotton manufactures is considerably larger than that of the American.

FIG. 59. Percentage of the world's cotton consumed in each country. (*U. S. Census Bureau.*)

FLAX

Why Flax for Linen is Not Grown in the United States. — Flax is the plant from whose fiber linen is made, and from its seed linseed oil, used in paints, is extracted. The United States is one of the four leading countries in the production of flax for seed (Fig. 35), but it produces very little fiber flax. While the people of the United States are the largest users of linen, they import practically all that they use. This is one of the instances in which a country has land and climate suited to a certain crop, and is a large user of the product made from that crop, yet does not raise it, at least not to any extent. We have, for another instance, a soil and climate as well suited to the tea plant as India or China has, yet we import all the tea we use. We could grow the mulberry for feeding silkworms as well as it can be grown in Japan or China, yet we do not do it. The reason in all three cases is the same: the production of flax fiber, of tea, and of silk involves the expenditure of a great amount of hand labor; machines will not do the work so well as the human hands can do it. These are industries whose location is determined not primarily by soil or climate but by low-paid laborers experienced in the particular industries. The high pay of laborers in the United States has forced this country to do everything by machinery that it possibly can, and to leave to other countries

certain industries that do not lend themselves well to the use of machinery. However, more and more work formerly done by hand is being done by machinery, as in the case of rice, which is now produced more cheaply in the United States with the aid of machinery than in the Orient with its cheap hand labor.

Method of Growing and Preparing Flax for Linen. — To get the best fiber for linen, the flax plant must be produced under very favorable conditions; it must have certain types of soil, the right summer temperature, and the right amount of rainfall at the right time. The best results are obtained by pulling the flax stalks by hand, and binding them into bundles by hand. Then the stalks must be threshed to remove the seed, and afterwards *retted*, a process of exposing them to the dew and rain for several weeks or soaking them in a stream for a week or two. After

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FIG. 60. Bleaching linen near Belfast, Ireland. The north of Ireland is one of the chief linen-making regions of the world, although most of the flax is imported.

this the stalks must be thoroughly dried, and later put through a machine that removes the fibrous coating of the stalks, and through another that combs the fine fibers apart and prepares them for the spinner. All of this work takes much time and labor; hence it must be done where labor is not too expensive. About 80 per cent of the world's fiber flax has been grown in Russia; Belgium, northern France, and the north of Ireland are also producers; about one third of the linen spindles of the world are in Northern Ireland, and Irish linen is famous the world over for its dependable quality.

The Value of Reputation. — This product well illustrates another principle in commerce, the value of a reputation based upon long-established excellence. Dealers in the United States say that if they offer customers Irish linen and American linen of equally good quality, the customers almost invariably take the Irish linen: so long has it been the standard of quality that buyers choose it in preference to any other. If American linen manufacturers attempted to compete with this imported product, years would be required to convince the public that the American product is actually as good as the imported one.

Hemp

Chief Sources. — Hemp is another fiber plant that can be grown in the United States in any quantity that is desired, yet is actually grown only to a limited extent. It is a much taller plant than flax, growing to a height of eight to twelve feet, and its fiber is coarser. It is used mainly for making twine, fishing lines, and carpet warp. Formerly, most of the hemp raised in the United States came from the Blue Grass region of Kentucky, where the work of growing and preparing it was largely done by hand labor. More recently the states of Wisconsin and Ohio have become the leading producers, Wisconsin growing nearly three sevenths of the hemp grown in the United States. The chief sources of hemp for the world market have been in south-central Russia, and to a smaller extent in Italy — in both of which countries cheap labor abounds.

Other Plant Fibers

Manila. — The so-called Manila hemp of the Philippine Islands — not hemp at all, but the fiber from a relative of the banana plant — is a tropical product, cultivated only in the Philippines. It is chiefly used for making twine and rope, and is imported into the United States in very large quantities for this purpose. Next to sisal it is the leading coarse fiber brought into the country, and its production is the most distinctive industry of the Philippine Islands.

Sisal. — Sisal or henequen is grown mainly in the peninsula of Yucatan, a part of Mexico; it is the fiber from which most

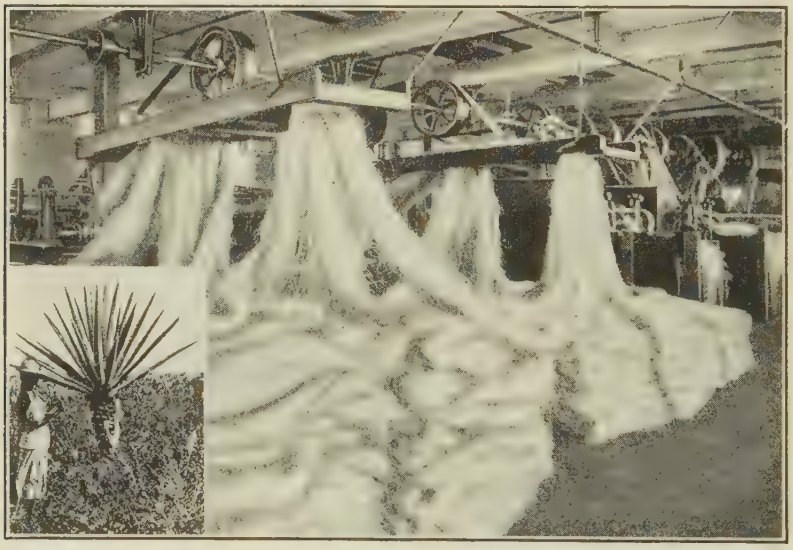

Fig. 61. One of the steps in the process of manufacturing the henequen or sisal fiber into binder twine. Henequen plant in the lower left-hand corner.

of our binder twine is made (Fig. 61). Since the invention of the self-binding harvester, nearly all of our wheat, oats, and other grains, in the process of harvesting, are bound into bundles with binder twine.

Jute. — Jute, the most extensively used of the coarse fibers, is nearly all grown in India on the lowlands of the Ganges basin. From this fiber are made the gunny sacks used by the millions for bagging coffee, sugar, grain, and other coarse commodities that are shipped in sacks. Our importation of jute and its products has reached $65,000,000 a year.

Example of the Geographical Division of Labor. — In Chapter I the importance of the division of labor in the modern world is discussed. The production of the plant fibers well illustrates this principle. The United States has the climate, labor supply, transportation facilities, capital, and accumulated experience necessary to produce cotton in enormous quantities, and we supply not only our own needs but those of a large part of the world. On the other hand, we have made little effort to supply our own needs so far as the other plant fibers are concerned. Because our climate is not suited to the growing of certain ones, and because our labor is too expensive to grow others, we leave their production to countries that can produce them more economically. Thus, we are sellers of cotton and buyers of manila, hemp, jute, and sisal. This practice illustrates the geographical division of labor — each part of the world doing what it can do best or most cheaply, and then exchanging products with the other parts of the world.

Summary

1. Of thousands of species of animals and plants, *one* animal — the sheep — and *one* plant — the cotton — supply most of the material for the clothing of the human race.

2. Five other plants supply fibers that are used in great quantities for special purposes: flax, hemp, manila, sisal, and jute.

3. The United States produces more cotton than all the rest of the world, but raises hardly any flax for linen, very little hemp and sisal, and no jute or manila.

4. The United States has the only area of *great extent* that seems well suited by reason of soil, climate, and location to the growing of cotton.

5. Cotton is the chief crop of the South. Much of it is grown by tenant farmers, both white and colored, and it is grown to the exclusion, in large measure, of other crops. Diversified farming, including stock raising, will benefit the agriculture of the South.

6. The boll weevil has gradually spread eastward and northeastward from the Mexican border and has brought enormous loss to the cotton states. Partially successful methods of combating it are being found.

7. The value of the different kinds of cotton depends largely upon the length of the staple. About 90 per cent of the American crop is short staple. Egyptian cotton has a longer staple, and sea-island cotton has the longest staple of all. Sea-island cotton, of which the supply is quite limited, sells for double the price of ordinary upland.

8. Cotton seed, formerly thrown away, now yields over $100,000,000 a year in cottonseed oil, meal, linters, and hulls.

9. Four countries raise about 94 per cent of the world's cotton — the United States (50 to 60 per cent), China, India, and Egypt.

10. Two regions in the United States manufacture most of our cotton goods: (1) New England, where the finer grades are made; (2) the Piedmont belt of Virginia, North and South Carolina, Georgia, and Alabama, in whose mills more cotton is used.

11. The district around Manchester, England, is the greatest cotton-manufacturing region in the world, and England leads the world in the exportation of cotton goods.

12. Flax for linen is nearly all grown in Europe, especially in Russia, Belgium, and Ireland, and is largely manufactured in Belgium and northern Ireland.

13. Hemp, a coarser fiber than flax, is grown chiefly in Russia and Italy, where labor is cheap.

14. Manila, one of the fibers from which rope is made, comes from the Philippine Islands; sisal, from which binder twine is made, comes from Yucatan; and jute, from which burlap and gunny sacks are made, comes from India. The world trade in these coarse fibers is extremely large.

Exercise

1. Why did early man use skins for clothing before he used cloth?
2. What is spinning? weaving?
3. For what other purposes besides clothing does man desire fabrics?
4. Why is cotton the most used of all fibers?
5. Why was cotton expensive prior to 1793?
6. What is a cotton gin? Who invented it?
7. What climatic conditions are most favorable to the growing of cotton?
8. Suggest reasons why the southern United States raises so much of the world's cotton crop.
9. Describe the processes of growing and picking cotton.
10. Why is much labor needed in the cotton fields in the autumn?
11. Why do southern farmers raise cotton to the exclusion — in a measure — of other crops? Explain why this is or is not a good thing.
12. What is the boll weevil? Why is it a pest of unusual importance? What success is being attained in combating it?
13. What is meant by the cotton "staple"? Why is sea-island cotton more valuable than other kinds?
14. Compare the various kinds of cotton with respect to length of staple.
15. Locate the principal cotton-growing sections of the South.
16. What is a cotton ginnery?
17. What is the weight of the ordinary bale of cotton?
18. How many pounds of cotton fiber, on an average, are produced to the acre?
19. What are the steps involved in marketing cotton?
20. What are (1) cottonseed oil; (2) oil cake; (3) linters?
21. What are the four chief cotton-growing countries? What per cent of the world's cotton is grown in the United States? Why do the cotton-manufacturing nations feel uneasy over this situation?
22. What advantages has the South over New England in cotton manufacturing?
23. What two products are obtained from the flax plant?
24. Why does not the United States raise flax for linen, or manufacture very much linen? What are the flax-growing countries?

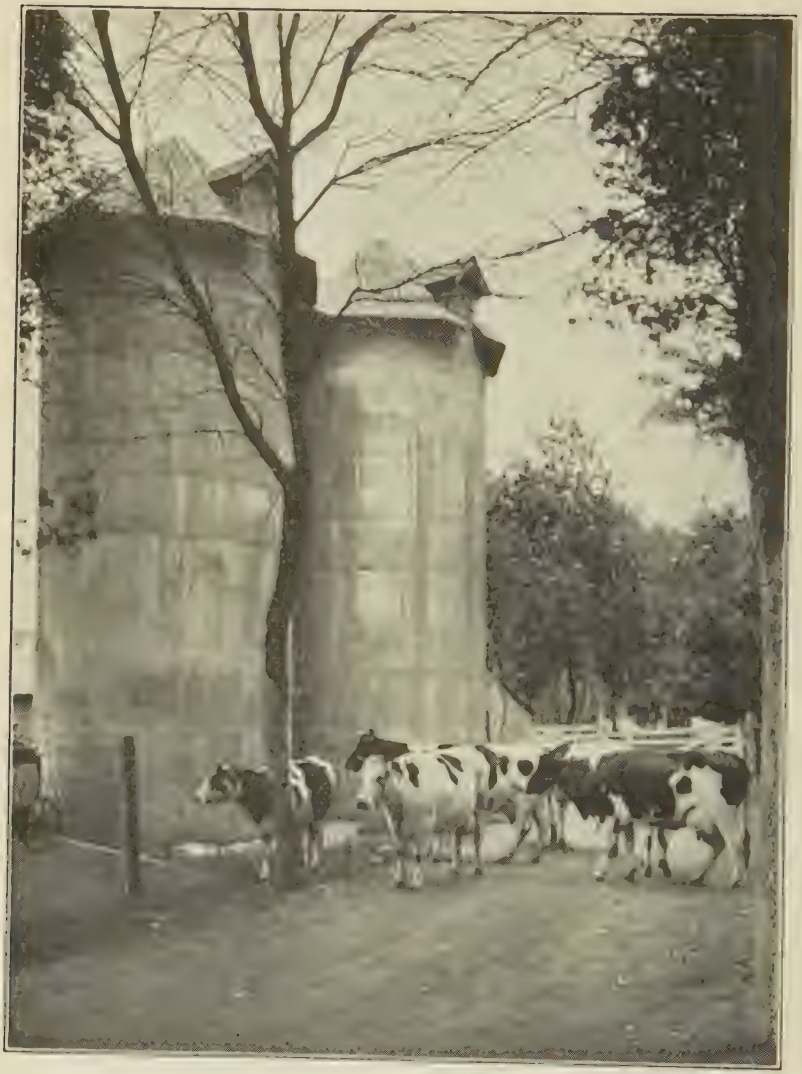

FIG. 62. Silos and dairy cows. In the silos, green fodder — usually cornstalks chopped into small pieces — is preserved for the winter feeding of cattle. This is an economical feed and an excellent milk-maker. The silo is one of the most valuable aids to winter dairying.

CHAPTER VI

THE ANIMAL INDUSTRIES

The Principal Domestic Animals

The Domestication of Animals. — The lower animals perform for mankind a variety of poorly appreciated services. All domesticated animals — the horse, cow, sheep, pig, goat, dog, and others — were originally wild animals. In the early stages of human progress men were hunters, and got most of their food by capturing or killing animals whose flesh they ate. But hunting is uncertain, and the hunter — depending upon the chances of the chase — may sometimes go hungry. Doubtless this fact suggested the advantage that it would be to him if he could capture and keep certain animals until he required them for food; then, when he needed them, he could go to an inclosure where they were confined and kill one for the day's food. Early man did more than this: he selected the young of certain animals, and trained them to work for him, as in the case of the ox and the horse; and to hunt with him, in the case of the dog. He also used the milk of the cow and certain other animals. Thus, far back before the days of written history, man domesticated animals and thereby he took a long step forward in the direction of civilization.

We shall not discuss here the services that the horse, ox, reindeer, mule, llama, yak, water buffalo, dog, and other animals perform for man, for those services are well known. Suffice it to say that if man were wholly deprived of the services which these faithful animals perform for him, agriculture and the movement of goods would, in many parts of the world, suffer a serious setback; and men and women everywhere would become beasts of burden, as many of them now are in backward countries.

Importance of Meat as Food. — The great service of certain animals to mankind lies in the fact that they eat coarse forms of

vegetation, which man cannot use directly for food, and convert them into a very nourishing form of human food — meat. The raising of agricultural crops requires much time and labor, but during the time that the farmer is devoting himself to this form of food production, his cattle and sheep may be grazing in the pastures and storing up food in the form of meat which costs the farmer but little labor. On vast areas of land that are poorly fitted for agriculture, millions of meat animals graze, and at the cost of little human labor yield a large contribution to the world's food supply. In many parts of the world meat is a somewhat expensive food, but it is demanded by most people who can afford it. So important is meat in the diet of the American people that slaughtering and meat packing is the largest manufacturing industry in the country in point of value of products.

Hay and the Cattle Industry. — Next to corn, the crop of greatest total value in the United States is hay. While the cattle and sheep can graze in summer, on most farms they must be sheltered and fed in winter, and hay is the chief winter feed for domestic animals. A map of the hay-producing regions would be somewhat similar to the map showing the distribution of dairy cattle (Fig. 75), except that little hay is produced in the Gulf states, where the winters are short and mild. Alfalfa, much grown in the central and western states, is the richest variety of hay, and it yields three or four crops a season. Clover and timothy occupy a much larger acreage, mostly in the northern states; and wild hay grows in the dry western part of the North Central States. Baled hay is an important item of domestic commerce, as it is shipped to dairy farms and to cities for horse feed.

Corn silage, or ensilage, consists of the corn plant cut green, chopped by machinery, and stored in tall tanks called silos (Fig. 62). It is fed chiefly to dairy cows in winter. Hence, the corn crops for silage are raised chiefly in the northern states, where large cities and dairies are located.

Ripe cornstalks from which ears of corn have been removed are used as fodder, mainly for cattle, throughout the corn-growing regions.

Beef Cattle in the United States. — By a process of selection and breeding extending over many years, beef cattle of high quality have been developed; this has been done especially in Great Britain, where the Hereford, Durham, Aberdeen-Angus, Galloway, and other famous breeds of beef cattle have been perfected. The raising of many beef cattle in the United States has two phases: (1) On the Great Plains and in pasture lands among the western mountains, large herds of cattle graze. In some cases they feed on the rather dry open-range or government land, of which there are still millions of acres in the mountainous West; in many cases they graze on land owned and fenced by the ranchmen. These cattle are referred to as *range cattle;* they feed almost wholly on grass, receive relatively little care, and do not ordinarily become sufficiently fat to make first-class beef. (2) The greater part of the range cattle are afterward shipped to the Corn Belt, where they are fed on corn for several months by the farmers of that section; here they become fat and sleek, and are then ready for shipment to the meat-packing centers.

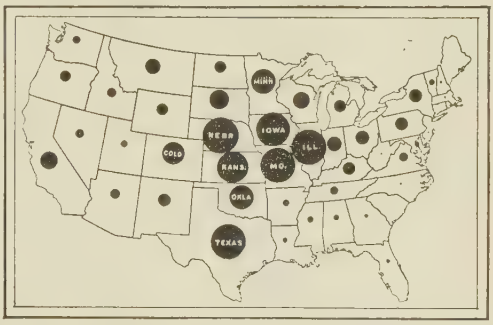

FIG. 63. Shipments of cattle and calves. Areas of circles are proportionate to numbers shipped. Five states (Nebr., Ill., Tex., Mo., and Iowa) ship more than half the cattle and calves shipped in the country. (*U. S. Dept. Agr.*)

Many cattle also are raised and fattened on the farms of the Corn Belt, and on other farms, and either are slaughtered near by or are shipped to the cities and packing centers. It will be seen from Figure 63 that cattle are raised in practically every part of the United States, but that they are most numerous in the states of the upper Mississippi Valley and the Great Plains, where corn or pasturage, or both, occupy a large part of the land.

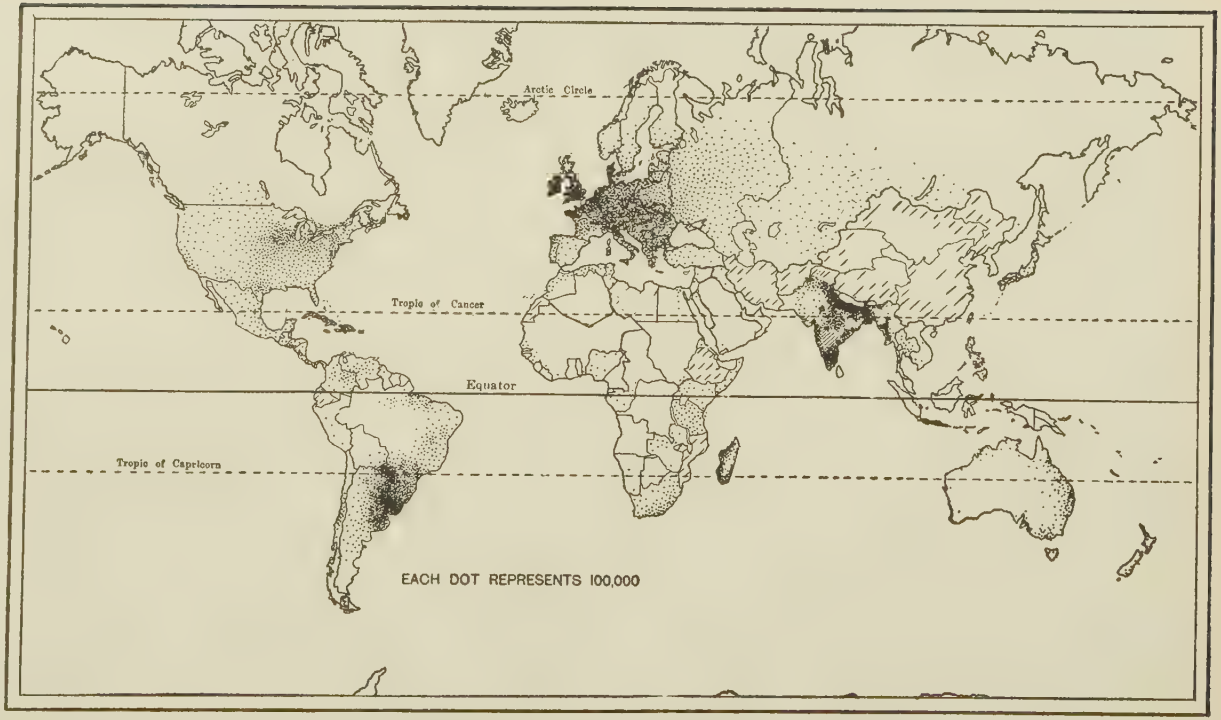

FIG. 64. Distribution of cattle in the world. (*U. S. Dept. Agr.*)

Cattle Raising in Other Countries. — Cattle are raised for meat and for milk in nearly all temperate lands, but there are four outstanding cattle-raising regions: (1) British India has 25 per cent of the cattle of the world, used mainly as work animals and as milk producers; both for religious reasons and on account of poverty the Hindus eat little meat. (2) The United States, with about 15 per cent of the world's cattle, ranks second. (3) Western Europe, as a region, has more cattle than the United States, but no one country has so many as the United States. The number of cattle to the square mile is much greater in certain countries of Europe than in any part of the United States; for example, the Netherlands, Belgium, Denmark, Great Britain, and Germany, where there are from 100 to 175 cattle to the square mile. (4) The fourth region is southeastern South America, including parts of southern Brazil, central Argentina, and all of Uruguay.

Swine. — Swine are raised in every part of the United States, but half of the total are found in seven Corn Belt states. A large

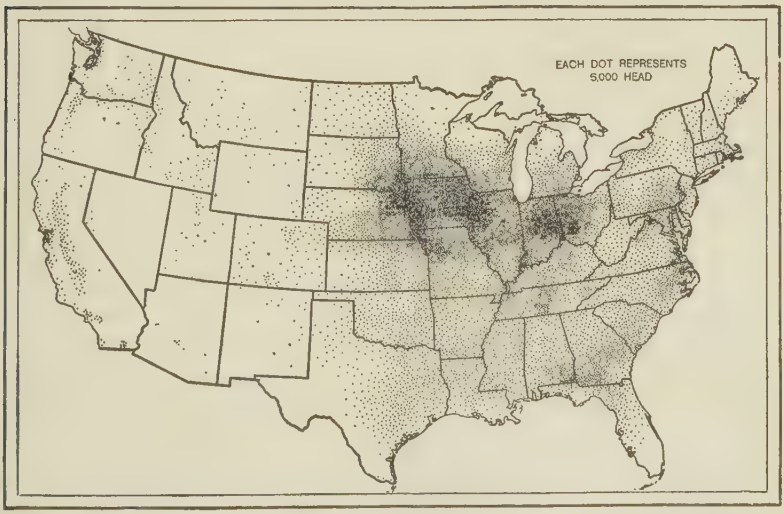

FIG. 65. Distribution of hogs and pigs in the United States. (*U. S. Dept. Agr.*)

part of the corn grown in this country is fed to hogs and cattle, for corn is rich in oil and consequently is fattening. Iowa is the leading hog-raising state, having about one seventh of all the hogs in the country. It is not unusual for a Corn Belt farmer to have from 100 to 150 hogs at a time. Not only does the United

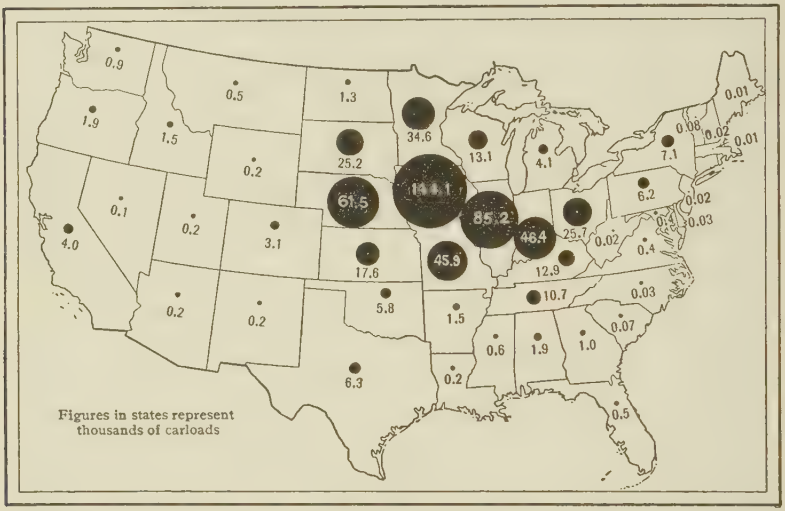

FIG. 66. Shipments of hogs. The area of each circle is proportionate to the number of carloads of hogs shipped from stations in the state in one year. Iowa, for example, shipped 144,100 carloads, which was about 25% of the total for the United States. (*U. S. Dept. Agr.*)

States supply the pork products for our own people, but it also exports great quantities of bacon, hams, shoulders, lard, and side pork.

Sheep. — Only Australia exceeds the United States in the number of sheep raised; Argentina has fallen to third place. Sheep are peculiarly the grazing animals of dry lands. They can feed on poorer pasturage than cattle; they can pick their way among rocks, climb steep slopes, and find a living where some animals would starve. Their thick fleeces fit them to live in cold climates, yet they also do well in warmer parts of the temperate

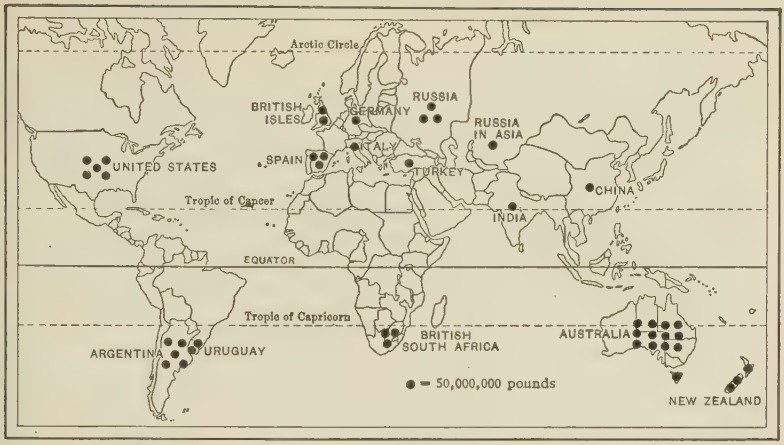

FIG. 67. Annual wool production of countries producing more than 50,000,000 pounds each. Wool is one of the few export products in which the southern hemisphere exceeds the northern.

zone, as in Australia and Uruguay. A number of special varieties of sheep have been developed, especially in Great Britain, which has more than half as many sheep as the entire United States. Certain varieties of sheep are raised for wool, others for mutton, and crossbreeds for both wool and mutton. Certain breeds have very fine wool; of these the merino, originally from Spain, is the finest, and it is now found in almost every country where wool growing is important.

In the United States great flocks of sheep graze on the semi-arid, mountainous land of Wyoming, Montana, Idaho, New Mexico, and all of the other western states (Fig. 19), but the number is smaller than it used to be. There are few in the humid South, for there the climate is too warm and moist for them. Ohio is the leading eastern state, and ranks high among the states of the Union in number of sheep. Mutton is not a favorite meat with the people of the United States, and the greater number of sheep in this country are raised primarily for wool, yet in addition to all the wool that we grow, we import from 200,000,000

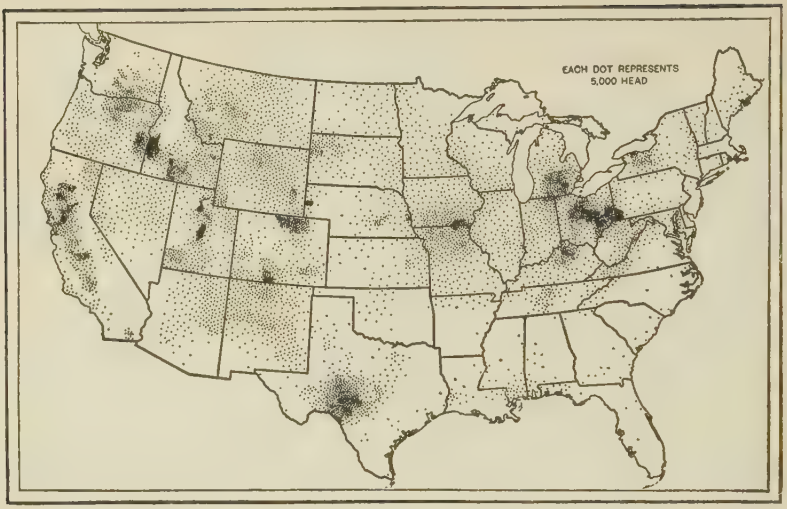

FIG. 68. Distribution of sheep and lambs in the United States. Over 60% are in the western half of the country. (*U. S. Dept. Agr.*)

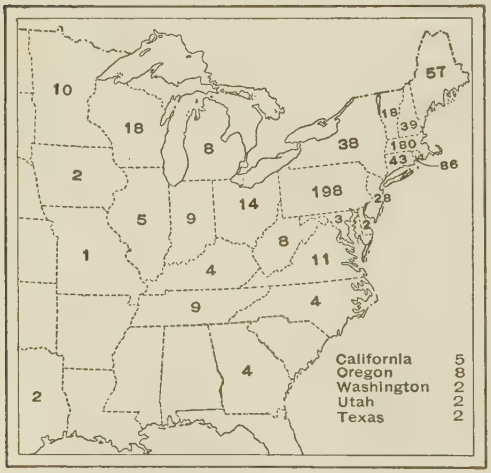

FIG. 69. Distribution of the 814 woolen and worsted goods mills in the United States. (*U. S. Census Bureau.*)

to 400,000,000 pounds a year, and export but little. On an average, each adult in the United States requires about 10 or 12 pounds of wool a year.

Wool Manufacturing.— The woolen industries, in one form or another, are widely distributed among the manufacturing states, but the chief centers are in the East. Lawrence in Massachusetts, and

Philadelphia, are the leading cities in the manufacture of woolen cloth, and there are many large woolen mills in other eastern cities. The mills in Massachusetts spin over 40 per cent of the wool used in the country, and five eastern states spin 80 per cent of it. Philadelphia is the country's chief center for the manufacture of carpets and rugs. Wool hats, felt goods, woolen stockings, sweaters, and other knit goods reach a value of hundreds of millions of dollars annually, and the combined woolen industry ranks high among our great manufacturing industries.

Horses and Mules. — In agricultural countries horses and mules are needed in large numbers. For eighty years the United States maintained a ratio of about one horse or mule to each four people, but the rapid rise of the automobile and autotruck has somewhat reduced this ratio. Mules are used much more in the South than in the North, for they are better adapted than horses to a warm, humid climate. Mules and donkeys are used as pack animals among mountains; and in places where food is poor and treatment is rough, the mule and donkey are superior to the horse.

Goats. — Goats have never found many friends in the United States. We have millions of acres of dry, rough land in the West and Southwest where goats, but hardly any other useful animals, can find a living. Two or three million of them are raised in the United States — mainly in southwestern Texas, New Mexico. Arizona, and on the Pacific Coast — but we have no important goat-raising industry in this country. However, in many parts of the world, notably in southern Europe, India, and South Africa, the keeping of goats for milk, flesh, hair, and skins is a very large industry. We import from 40,000,000 to 50,000,000 goatskins a year for use in our shoe industry and other leather industries.

Poultry. — On an average every man, woman and child in the United States eats about 100 eggs a year. Nearly five hundred million fowls are raised and most of them are eaten. The annual value of the eggs and poultry produced is more than ten times as great as that of the gold mined each year in the United States. The grain-growing states in general, and Iowa, Illinois, and

FIG. 70. Poultry houses in New Jersey. The white leghorns, here shown, are one of many valuable breeds of hens.

Missouri in particular, are the great producers of poultry and eggs, while the chief consuming regions are somewhat farther east, where population is dense. More eggs are laid in spring than in any other season, and a surplus then occurs. The surplus eggs are put in cold storage and sold to the public later when the prices are higher. If properly controlled by law, this practice results in general benefit, for the prices are regulated both for the producer and the consumer.

SLAUGHTERING AND MEAT PACKING

The Meat-Packing Industry. — In value of products, the industry of slaughtering and meat packing leads all other manufacturing industries in the United States. A generation or more ago a much larger proportion of the meat animals was slaughtered on the farms and in the villages and towns than is now the case.

But the great development of cold storage and the extensive use of refrigerator cars (Figs. 2, 363), together with the strong modern tendency toward large-scale production, have centered slaughtering and meat packing in certain cities, especially in the Central States, and notably in Chicago. All the great meat-packing companies have plants in that city, and the most extensive stockyards in the country are there (Fig. 71). Tens of thousands of cattle, hogs, and sheep are slaughtered daily in these enormous plants. The processes of killing, dressing, cooling, smoking, pickling, canning, and packing have been reduced to such a degree of efficiency that the whole process moves like a great machine — cattle and hogs entering one end of the plant and trainloads of finished products moving out at the other end. Nothing is wasted; some use is found for every part of the animals.

The Meat-Packing Companies as Examples of Modern Industrial Enterprises. — One of the most striking features of our manufacturing enterprises is the size which some of them have

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FIG. 71. A small part of the Chicago stockyards, the most extensive in the world.

attained. As a rule they have grown from small beginnings. Under the leadership of men of great force and ability, these corporations have gone on accumulating capital, building more plants and larger ones, buying up competitors, gaining control of related industries (including means of transportation, and marketing agencies), and eventually have become industrial giants of such strength that the government had to curb their power. Large corporations exist in several other countries, but nowhere in such numbers and of such size as in the United States. Two reasons for this are: (1) the great purchasing power of the American people, and (2) the large sums of money available for investment.

Since meat is a food product used in large quantities, it naturally forms one of the products around which to build up great corporations. Steel, oil, copper, and sugar are other products similarly dominated by powerful corporations.

As an example of the extent of these modern enterprises, let us take one of the meat-packing companies centered in Chicago. It has property valued at $500,000,000. Its capital stock — while controlled by a small number of men — is actually distributed among about 50,000 different stockholders. It employs 60,000 wage earners, has twenty-three meat-packing plants, and sixty other plants in various parts of the United States and in South America; it owns over 400 branch houses in as many cities, from which its products are distributed to retailers; it uses 7500 miles of private telegraph lines, and every week sends out thousands of carloads of products in its 7000 refrigerator cars, covering more than 400 car routes and reaching several thousand points throughout the entire United States. The company in 1920 used 1800 horse-drawn wagons, 1000 motor delivery trucks, and 1400 salesmen's automobiles. Besides its enormous meat business, it has over a dozen factories in which it makes a total of 20,000,000 pounds of oleomargarine a year. It is one of the largest dealers in butter, cheese, poultry, and eggs in the United States, handling, for example, a million pounds of butter a week. It manufactures a great variety of by-products, including soap, glue, oils, fertilizers, and bone products. Its total sales amount to over $1,000,000,000 a year, which is more than the total yearly exports of such important countries as Argentina or Brazil.

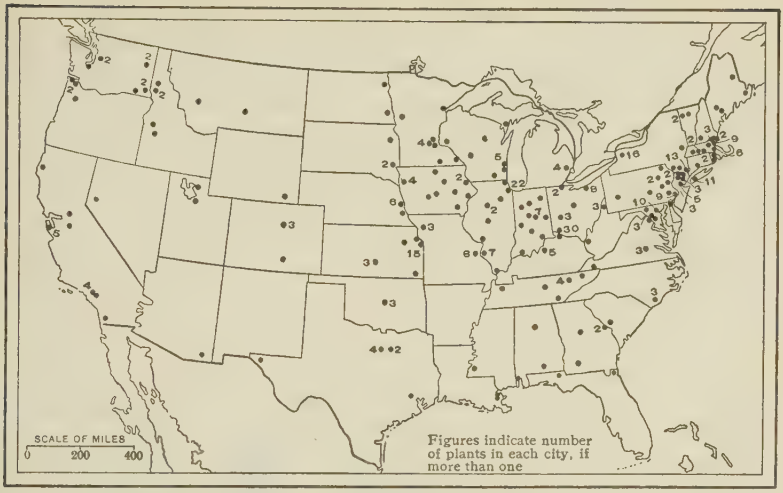


FIG. 72. Location of 895 government-inspected slaughtering plants (in 163 cities). Compare with Figure 73.

Beef from Ranch to Retail Market. — Suppose we trace a steer from the ranch in Colorado to the stockyards at Chicago, through the packing house, and out to the retail market. At about two years of age the animal — now full grown, but not fat — is loaded with others from the same ranch into a cattle car, which is soon attached to a special cattle train destined for Chicago or some other packing center. The train makes few stops, travels rapidly, and is usually given the right of way. When it reaches the stockyards in, let us say, Kansas City, the cattle are unloaded into inclosures or pens, they are fed and watered, and are inspected by a government inspector who condemns any diseased cattle. The cattle are consigned to commission merchants, whose business it is to sell them for the owners. The steer and his companions may be sold to a farmer in the Corn Belt who reloads them into a cattle car and takes them to his farm for fattening. In a few months the steers have become fat and plump and are ready for the packing house. They are shipped by train, say, to the Chicago stockyards, and are again sold, — this time to a buyer employed by one of the meat-packing companies. The steer and his fellows pass in single file through a particular entrance to the slaughterhouse, and in thirty-two minutes the animal is slaughtered, skinned, dressed, and perhaps quartered, and passes into the cooling room; forty-seven different men, each

performing one operation, have taken part in killing and dressing the animal. For a few days the meat hangs in the cooling room and is chilled almost but not quite to the freezing point. Then it is loaded into a special refrigerator car belonging to the packing company, and is shipped to one of the many branch houses of the company. The branch house has a cold-storage room, office, delivery wagons, etc., owned by the company, and is under the control of a local manager. From this branch house the local retailers purchase their meat, which is delivered to them in one of the company's trucks. Thus, from the stockyard to the retail market, the meat-packing company controls every transaction.

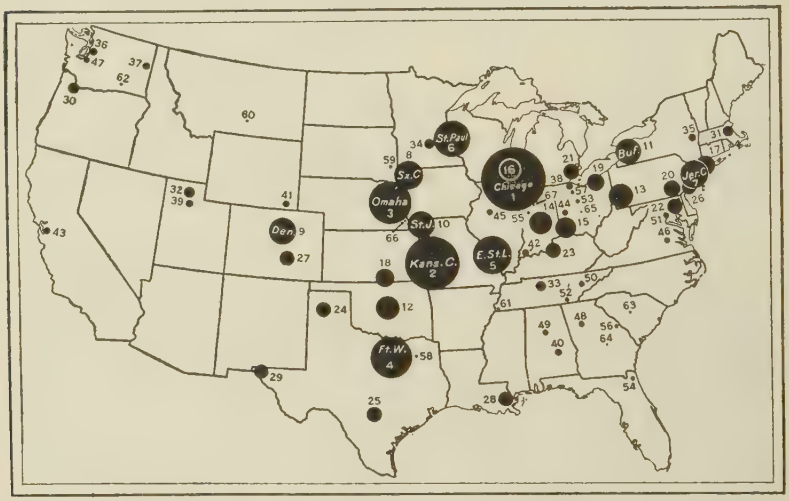


FIG. 73. Receipts of cattle and calves at 67 public stockyards. Areas of circles are proportionate to the numbers received in one year. The circle for Chicago surrounds that for Milwaukee, the 16th in size; that for Jersey City, the 7th in size, overlaps those for New York, the 17th, and Philadelphia, the 26th. (*U. S. Dept. Agr.*)

Why the Great Meat-Packing Centers are in the Central States. — The slaughtering of meat animals is by no means confined to the Central States; New York, Jersey City, Buffalo, Fort Worth, Portland, Denver, and a number of other cities in the East, South, and Far West, have large slaughtering plants;

but the highest development of this industry is in eight cities in the Corn Belt, where more than half of the cattle and hogs are raised. These cities are Chicago, Kansas City, Omaha, East St. Louis, St. Paul, St. Joseph, Indianapolis, and Sioux City (Fig. 72). It is costly to ship the live animals long distances by train; moreover, they lose weight and often are injured. Only about half the weight of the animal is meat; most of the other half has a low value. It is therefore desirable to separate these two classes of products before they are shipped to the eastern cities.

Dairying and Dairy Products

For excellence in producing milk, several breeds of cattle have been highly developed, such as the Holstein, Jersey, and Guernsey.

Reasons for the Wide Distribution of Dairying. — Fresh milk is needed every day in every home. In order that it may be delivered fresh and sweet, it must be produced reasonably near

Fig. 74. A choice herd of dairy cows at rest in a modern dairy barn.

the places where it is to be used. Dairying, therefore, exists in the vicinity of practically every American city; a few dairy cows are quite generally kept by farmers, but certain farmers make dairying a specialty. Regular milk trains run daily into all large cities, and the handling and distribution of fresh milk is an important industry in every city. For example, the city of New York uses between 2,500,000 and 3,000,000 quarts of milk daily.

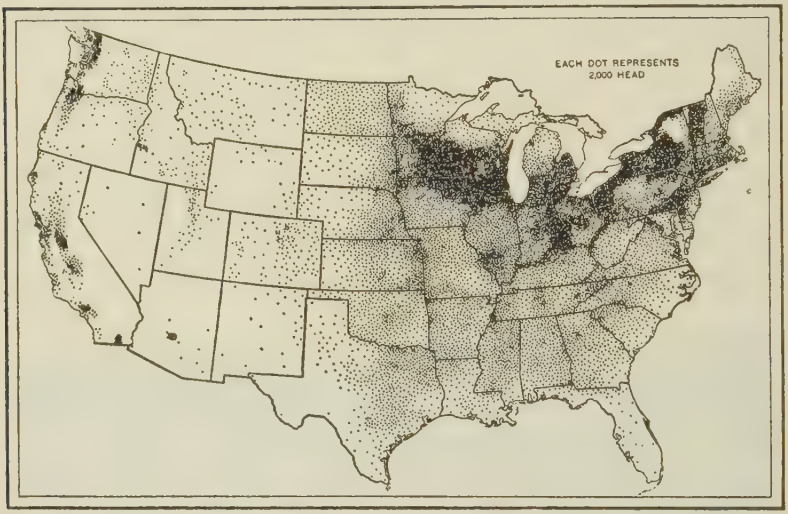


FIG. 75. Distribution of dairy cattle (excluding calves) in the United States. (*U. S. Dept. Agr.*)

Principal Dairying Regions of the United States. — Because of the density of population in southern New England and the Middle Atlantic States, this region is important in the production of milk. For many years New York was the leading dairy state, but now it ranks second to Wisconsin. The hilly topography, cool climate, and good grass of New England and the Middle Atlantic States are favorable to dairy farming, for cattle can graze on hills that are too steep to cultivate, and milk is more easily kept sweet and wholesome in a cool climate. All of our leading dairy states are in the North. The region of greatest

density of dairy cattle is in Wisconsin, northern Illinois, and the adjacent states of Iowa and Minnesota (Fig. 75). The United States as a whole has one dairy cow for every five persons, but Wisconsin has an average of one for each person in the state.

Butter, Cheese, and Preserved Milk. — The chief butter-making and cheese-making belt of the United States is on the northern edge of the Corn Belt in Minnesota, Wisconsin, and Iowa; but butter is an important product in the Corn Belt itself, and in California; and thirty or more different states annually make upwards of 1,000,000 pounds each. The three leading states make over 100,000,000 pounds each a year. Butter factories and cheese factories are thickly scattered over these states, usually within a few miles of the farms that supply them daily with milk. To an increasing extent farmers are separating the cream from the milk at home, and sending only the cream to the creamery. Wisconsin has become the leading cheese-making state (Fig. 76), and Minnesota, Wisconsin, and Iowa lead in butter making. Great quantities of milk are also sent to condensing and evaporating plants, which convert it into condensed milk, powdered milk, or some other form that permits it to be shipped to any part of the world. The manufacture of ice cream has grown to be another large industry. An idea of the importance of the dairy industry may be gained by recalling that all the gold mined in the world annually would not pay for the milk produced in the two leading dairy states, Wisconsin and New York.

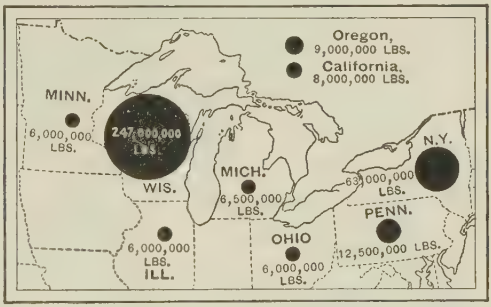


FIG. 76. Annual production of cheese in the principal states. Wisconsin makes about two thirds of the total. (*Adapted from U. S. Dept. Agr.*)

Skins and Furs

Hides, Skins, and Leather. — The toughness and flexibility which make the animal's skin an ideal protection for its possessor, make the same skin, when tanned, one of the toughest and most durable of materials. "Skins" come from the smaller animals like sheep, goats, calves, kids, and dogs, while "hides" come

Fig. 77. Sorting leather in a Massachusetts tannery. Eastern Massachusetts has many large tanneries and is the principal shoe manufacturing section of the United States.

from the larger animals such as cattle and horses. From these skins and hides a great variety of leathers are made, each kind having its own particular qualities. The method of tanning also has much to do with the character of the leather. For light shoes and gloves, the thin, light leathers made from the skins of the kid, goat, kangaroo, colt, and sheep are used. For somewhat heavier shoes, calfskins and sometimes horsehides are used. The skins of the deer (buck), antelope, and certain other wild animals make

very tough, pliable, light leathers. Alligator skins are used for hand bags, pigskins for footballs, and cowhides for sole leather, harness leather, and suitcases.

The United States produces great numbers of sheepskins, calfskins, horsehides, and cattle hides, but it imports most of its kid skins and goatskins, and many cattle hides as well. For example, in a single year we have imported 50,000,000 goatskins, 35,000,000 sheepskins, and 10,000,000 cattle hides. Leather and its products form one of the world's great branches of industry and commerce, and the United States is easily the leading nation in the manufacture and use of leather products. Philadelphia and the region around Boston are the chief eastern centers of leather working; while Milwaukee and Chicago are leading centers in the Middle West (Fig. 143).

Furs. — Nature provides many animals of the cool or cold climates with a coat of fur which man finds useful. While Canada, Russia, and Siberia are the world's great sources of furs, many come from other lands, including the northern United States. The beaver, once very numerous in North America, is now rare. Among the fur-bearing animals still captured in large numbers in North America are the fox, ermine, marten, mink, muskrat, otter, raccoon, sable, skunk, seal, and lynx. The hunting and trapping of these animals is carried on as a regular occupation in the forests of Canada, but in the United States most of the animals are caught or killed by casual hunters and trappers. The furs are collected by buyers who in turn sell to the fur companies. Until recently the great fur market of the world was London, with Leipzig the leading continental market. A large part of the furs that entered commerce in the past were marketed, graded, and treated in these two cities. In the United States, St. Louis and New York are the principal markets, and they have to a considerable extent supplanted London and Leipzig. Following the World War the people of the United States, being financially better off than most others, became great buyers of furs, and the sale of fur garments in this country reached into the hundreds of millions of dollars a year.

Summary

1. Domestic animals are descendants of ancestors that were originally wild.

2. Work animals do an enormous amount of labor for man and this has been an important factor in his rise in civilization.

3. By feeding upon vegetation which man cannot use for food, and by transforming this into a concentrated form which man can use, meat animals contribute greatly to the world's food supply.

4. Animals may graze on lands too rough or too dry to be used for agriculture, and thus they turn these lands to profitable use.

5. Food production through agriculture is laborious, but meat animals supply a great amount of food with relatively little outlay of human labor.

6. By systematic selection and breeding, especially valuable types of beef cattle and dairy cattle have been developed.

7. Many cattle, raised in the semi-arid lands and in the mountain valleys of the West, are later shipped to the Corn Belt for fattening.

8. India has more cattle than any other country, but the United States uses far more cattle for beef than any other country.

9. The United States is the world's largest producer and exporter of pork products, which come largely from the Corn Belt.

10. All over the world, sheep are the animals of the dry lands or rough lands, notably in Australia, Argentina, and the western United States; but they are also raised in humid regions, as, for example, the British Isles.

11. While the United States is a very large producer of wool, it is also a very large importer.

12. Slaughtering and meat packing, mostly done in the cities of the Corn Belt, is the largest manufacturing industry in the United States so far as the value of products is concerned. Chicago is the leading city.

13. Dairy cattle for supplying fresh milk are kept in large numbers in the vicinity of nearly all cities, but in certain states — especially Wisconsin, Iowa, and Minnesota — much of the milk is made into butter, cheese, and preserved milk to be sold in other states and abroad.

14. Hides and skins by the millions are produced in the United States or are imported for the making of leather. Furs come largely from the cold regions such as Canada, Russia, and Siberia.

Exercise

It is suggested that each member of the class prepare a written topic dealing with some aspect of animal life or of the animal industries. Material for the topics should be gathered from various sources. The encyclopedias have articles on the horse, the camel, the sheep, and other animals; on dairying, tanning, leather, furs, and similar subjects. Chicago packing houses issue booklets. Publications of the U. S. Department of Agriculture, and of the various state departments of agriculture, of the dairymen's associations, and similar bodies, are readily obtainable.

Suggested Topics:

1. A visit to the stockyards.
2. The dairy industries of my own state.
3. Animals that serve man in many lands.
4. How the people of my city are supplied with milk.
5. Sheep raising in Australia.
6. The story of a steer from ranch to retail market.
7. The growth of meat packing in the United States.
8. Dairying in Denmark (or Holland).
9. Fox farming in Canada (especially on Prince Edward Island).
10. Should the goat be despised?
11. The story of a sirloin steak.
12. How a large city (New York or Chicago) is supplied with milk.
13. The autobiography of a pair of shoes.
14. The leather industries of the United States.
15. The many breeds of cattle and the special merits of each.

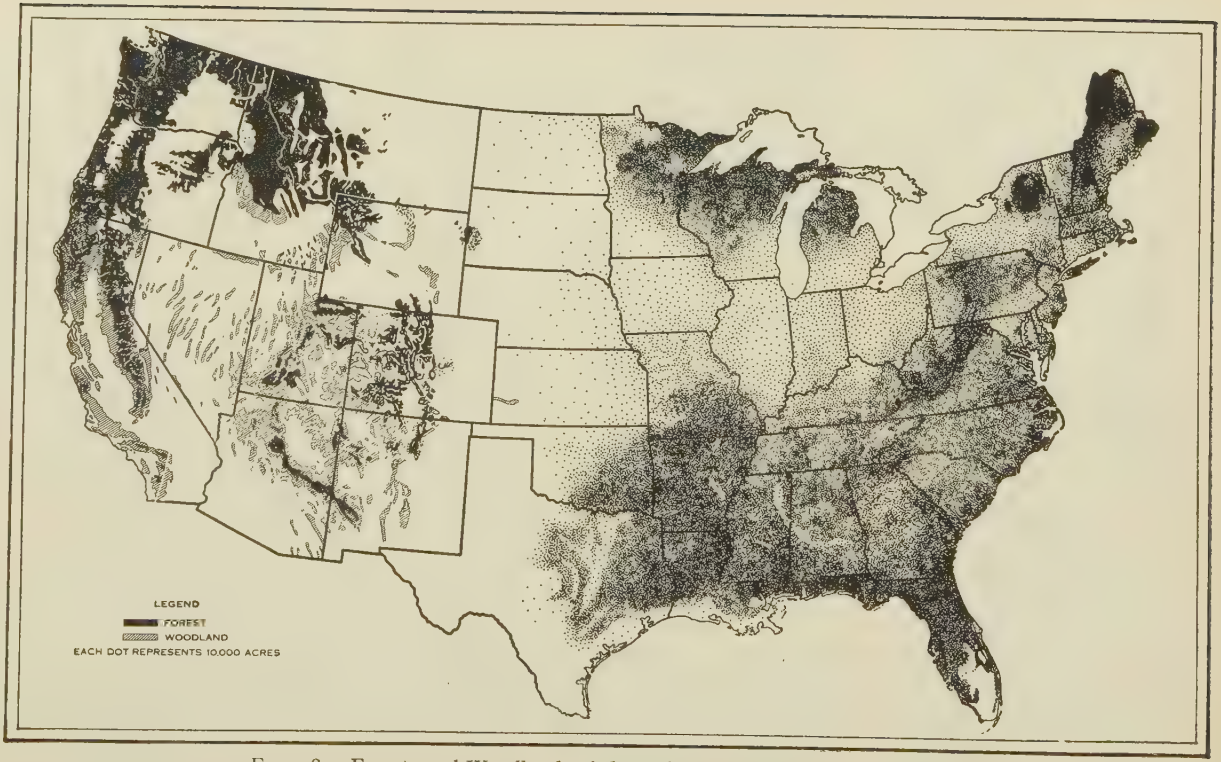


FIG. 78. Forests and Woodlands of the United States. (*U. S. Dept. Agr.*)

CHAPTER VII

TIMBER AND WOOD PRODUCTS

The Rapid Removal of American Forests. — When the Europeans began settling the New World, forests covered half the area of North America, including nearly all of the eastern third. The settlers sought agricultural land, and a great deal of timber was cut and burned merely to get rid of it. At this stage, standing timber not only had little or no market value, but it was an obstacle to agriculture, and hence it was worse than valueless. Getting rid of the forest was one of the most laborious and sometimes unprofitable necessities to many pioneers until about 1840 or 1850, and, in some of the more remote parts of the country, until later periods.

The rapid growth of population in the United States, the prevailing practice of building houses, bridges, sidewalks, and many other structures of wood, and of using wood for fuel, together with the export trade in lumber, led to rapid destruction of the most accessible forests, especially where they stood on good agricultural land. Already about two thirds of our forest lands have been cut over, culled, or burned over, and three fifths of our merchantable timber is gone.

The Forest Belts of the United States. — Figure 79 shows the location of the forest belts of the United States.

The Northern forest that extended from Maine to Minnesota — the region of the white pine — is now practically all cut over or culled. The splendid forests of this region were near the chief centers of population and near the Great Lakes waterway, and their timber was cut and marketed rapidly.

The Central hardwood forest for the most part stood on agricultural land, and though hard wood was used for lumber much less than soft wood, it also disappeared rapidly before the

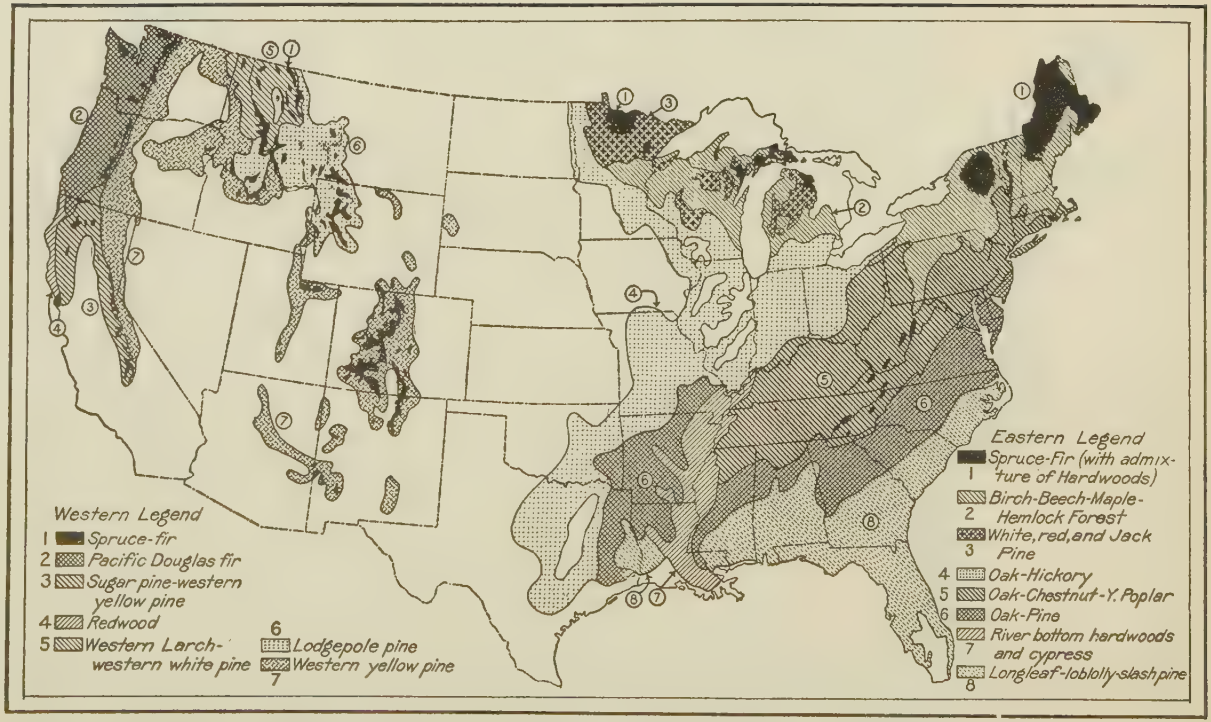


FIG. 79. Original forest regions of the United States. (*U. S. Dept. Agr.*)

ax of the pioneer; it is nearly gone, except on the wood lots of the farmers and on the more inaccessible hills and mountains.

The Southern forest, extending in a broad belt parallel to the Atlantic and Gulf coasts, is the home of the yellow pine, the tree that now supplies more of our lumber than any other. Louisiana, in this belt, ranks second among the states in total production of lumber. The yellow pine of the South was left standing until the more choice white pine of the North had been nearly exhausted. Now it is being marketed rapidly.

The Rocky Mountain forest is made up of many scattered areas on the various ranges of mountains, wherever the rainfall is sufficient to support trees. The trees are nearly all soft woods, or conifers, and because they are difficult to get at, and are not near the centers of population, a large part of this forest belt remains; but it is not a belt of great timber resources.

The Pacific forests, mainly in northern California, Oregon, and Washington, and continuing into British Columbia, are among the most magnificent forests on the face of the earth. They include the giant sequoias, or "big trees" of California, only a few groves of which are left; and they include also an enormous stand of the princely Douglas fir and the cedar. On the western side of the Cascades the rainfall is heavy, the winters are mild, and the soil is deep. These are the ideal conditions for the growth of forests. It is doubtful if in any other part of the world such magnificent trees stand in such numbers as they do in these forests of the Northwest. They attain a diameter of from five to eight feet, and many reach upward as straight as an arrow for eighty to one hundred feet without a limb. One stands among them and gazes in wonder and admiration. Washington was in 1923 our leading lumber-producing state.

Magnitude of the Lumber Industry. — The sawing of lumber and the further working of lumber into manufactured products constitutes one of the great branches of industry of the United States and of our neighbor, Canada. It is the leading manufacturing industry in no less than fourteen of our states.

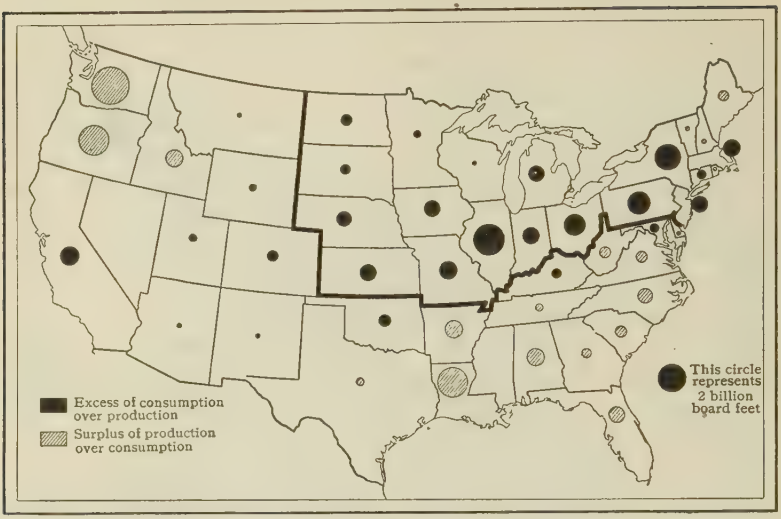

Excess of consumption over production
Surplus of production over consumption
This circle represents 2 billion board feet

FIG. 80. Timber shortage or surplus of each state for one year. The section north and east of the heavy line cuts only 23 per cent of the timber it uses. (*U. S. Dept. Agr.*)

In the number of men employed, it ranks third among our thirteen major groups of manufacturing industries, being exceeded by only steel products and textiles. At times, as many as 50,000 sawmills were operating, but the present tendency is toward fewer mills and larger ones. Lumber and other forest products supply an enormous traffic to the railroads — 10,000,000 carloads in a good year. Although lumber is cut in every state, the great bulk of it now comes from the South and from the Northwest. We export a great deal of lumber, especially through Gulf ports and north Pacific ports; yet our exports amount to less than 10 per cent of the annual cut. Yellow pine from the South now supplies more lumber in the United States than any other four kinds of wood combined. Douglas fir from the Pacific coast ranks second.

Lumbering in the North Woods. — The northeastern forests, extending over a thousand miles east and west from Maine to Minnesota on both sides of the Canadian boundary, are often

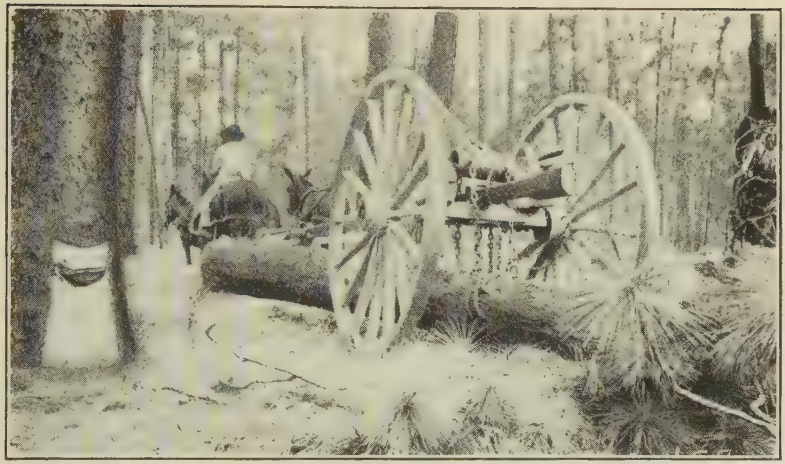


FIG. 81. Moving a log in a southern pine forest. Note at the left a pine tree with a "box" cut in it for catching the liquid resin that exudes from the tree.

referred to as the North Woods. They are mixed forests containing many species of hard and soft woods, but the most valuable tree was the white pine, prized for its fine grain, strength, durability, and lightness. Every carpenter was happy when he could work with clear white pine, but the carpenters of to-day have little opportunity to do it, for the white pine is scarce and expensive. Many of the trees were gigantic in size, and on good soil they stood in great numbers. During the winter, small armies of lumbermen went into the forests, built the lumber camps, felled the trees, hauled the logs with horses and sleds to the stream bank, and there piled the logs by thousands to be floated, or "driven," down the river when the spring floods came. Along the rivers stood hundreds of sawmills. Sometimes the lumber was made into rafts and floated down the rivers to the Great Lakes, the Mississippi, or to some other body of water to be rafted or shipped to the cities and towns of the rapidly developing Middle West or the populous East. The lightness of the white pine, the heavy snows and spring freshets

of this northern region, and the many rivers and lakes, all combined to make lumbering in this region quite inexpensive. The lumber sold at what now seems like impossibly low prices, yet fortunes were made in the business. Especially was this true in Michigan, Wisconsin, and Minnesota, each of which was in turn the leading lumber-producing state.

The Hard Woods. — The principal hard woods are oak, maple, birch, elm, ash, hickory, walnut, cherry, and gum. These woods

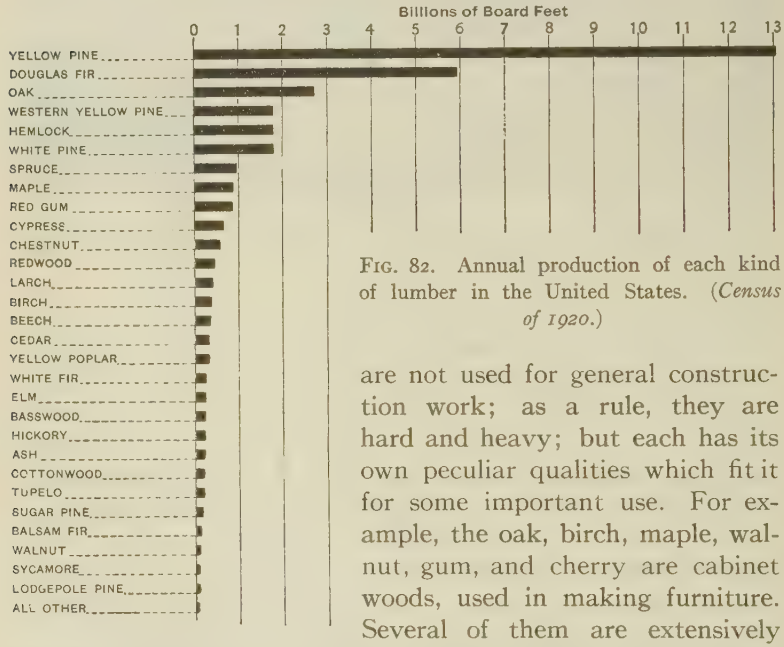


FIG. 82. Annual production of each kind of lumber in the United States. (*Census of 1920.*)

are not used for general construction work; as a rule, they are hard and heavy; but each has its own peculiar qualities which fit it for some important use. For example, the oak, birch, maple, walnut, gum, and cherry are cabinet woods, used in making furniture. Several of them are extensively used for the interior finish of houses. Hickory is one of the strongest of woods, and is used in the making of wagons, and for the spokes of automobile wheels. Elm is tough and flexible, and is especially suited for barrel staves. Various hard woods are used for fuel, and even now this is one of the chief uses to which wood is put in country homes over large parts of the country.

© *Ewing Galloway*

FIG. 83. Lumber docks along the water front of Baltimore, one of the important lumber ports of the United States.

The Naval Stores of the Southern Forests. — From New Jersey to Florida and thence westward to Texas stretches what is left of our great forest of southern pines. More than half of this belt has been cut over. It is a region of much sandy soil, and on such soil the pines can drive out almost any other tree. From the long-leafed pines are made large quantities of turpentine, resin, and pine tar. These products are called *naval stores*. The trees are tapped or scarred and from the incision slowly flows a liquid which is caught in cups or in a "box" (Fig. 81) and is put through a process of distillation which yields naval stores. The Gulf states and Georgia, but especially Florida, are the chief producers, and Savannah in Georgia is the world's chief market for these stores. Here the market price of naval stores for the entire world is fixed twice daily and is telegraphed to other markets.

Forests and the Tanning Industry. — Leather is made from hides by the process of tanning. Formerly the tanning fluids were made from vegetable extracts, the chief of which came from oak bark and hemlock bark. Hemlock trees grew abundantly in both the northern and the central forest belts, including the Appalachians, and hundreds of small tanneries existed throughout these regions as long as hemlock and oak barks were readily obtainable. However, as the forests were cut off, bark became more expensive, and the little tanneries disappeared. Pennsylvania had a great deal of hemlock, and still tans a greater value of leather than any other state.

Gradually other kinds of tanning extracts have come into use — among them *quebracho* extract from South America; but still more important at present are certain compounds of the mineral *chromium*. Tanneries are no longer exclusively located near the forests, and, following the modern tendency toward consolidation, they have become more and more centered in certain large cities such as Philadelphia, Milwaukee, Chicago, and Newark. Tanning extracts obtained from oak, hemlock, chestnut, and other vegetable sources are to a large extent made near the forests and then shipped to the tanneries.

The Furniture Industry. — Throughout the belt of hardwood forests many furniture factories, large and small, grew up in the same way that tanneries did. They used woods supplied by the near-by forests, and sold most of their furniture to the people of the surrounding region. It was a local industry and the furniture was mainly of very ordinary quality, although, here and there, skilled cabinetmakers produced pieces that are still sought out and paid for generously. Almost every town in the hardwood belt had at one time its cabinet shop or small furniture factory, but by reason of the depletion of the forests and the increasing tendency toward large-scale production in cities, the small local furniture factories have given way and have largely disappeared. However, the industry is still widely diffused in both the North and the South. A great deal of moderate-priced furniture is made in the western Great Lakes states — especially in Michigan

Karpen Bros.

FIG. 84. Assembling room in a modern furniture factory.

and Wisconsin, and in the Appalachian region of the East and South.

Grand Rapids, Michigan, is the nation's greatest center for the manufacture and sale of high-grade furniture. In this single city are a score of widely known furniture factories. Scarcely less important are the great furniture sales held there yearly. Manufacturers from other cities bring sample furniture to the great display warehouses of Grand Rapids, and buyers from all over the country assemble there to see the displays of furniture and make their purchases for the next season.

The Manufacture of Vehicles and Farming Implements. — When hardwood lumber was still cheap and abundant, it was much used in the manufacture of wagons, carriages, and farming implements. Naturally, these industries were chiefly located in

(1) the region near the hardwood forests, and (2) in the region of chief demand; the states of Ohio, Indiana, Michigan, Illinois, and Wisconsin — leading agricultural states — became prominent for their manufactures of wagons, carriages, and farming implements. Cincinnati was famous for carriages, and South Bend in Indiana, Jackson in Michigan, Racine in Wisconsin, and a number of other cities were important centers of wagon making. These industries have greatly changed in recent years, for steel has supplanted wood in the manufacture of farm machinery, and the automobile and autotruck have to a great extent replaced the carriage and wagon. However, these same states now contain the chief centers for the manufacture of automobiles and farm implements. This fact illustrates "the persistence of a rooted industry," that is, the strong tendency of an industry that is firmly established to remain in a given place, changing its character gradually to meet changing conditions.

Materials from which Paper May be Made. — Paper may be made from a great variety of plant products, because the essential substance is cellulose, and this is contained in all of the higher plants. Only in a relatively few, however, are the quantity and character of the fiber suitable for paper making. The stalks of corn, sorghum, and cotton, the straw of various grains, flax, and hemp, and certain tough grasses, rushes, and canes, have all been used in making paper; but in most cases these plants cannot be obtained in sufficient quantities and with sufficient cheapness to compete with pulp made from wood.

Paper pulp is made from many forest trees, including the pine, fir, hemlock, tamarack, and poplar; but the most used of all is the spruce, which grows in our northern border states and in Canada. Spruce supplies more than half of the paper pulp made in North America, but it is already approaching exhaustion on this side of the border, and we are drawing more and more heavily upon Canada. The rapidity with which our pulp woods are being used up is leading to an increase in the price of paper, and is causing alarm with regard to future supplies. As a people we are recklessly wasteful of paper and of all wood products.

Location of Pulp and Paper Mills. — Three important factors influence the location of wood-pulp mills and paper mills. (1) Because of the weight and bulk of the logs, the pulp mills must be near the forests. (2) A great deal of power is needed for running wood-grinding machinery, and water power is preferred, because it is cheap; hence most of the mills are located at water power sites on rivers. (3) The great printing and publishing centers which use the news-print and book papers are in the northeastern quarter of the country. All of these factors — but mainly the first — have led to a concentration of pulp and paper mills in New England, New York, Pennsylvania, Michigan, Wisconsin, and Minnesota, and in southern Canada (Fig. 85).

FIG. 85. Location of the wood-pulp mills of North America. (*U. S. Forest Service.*)

Mills making paper products of some kind are found in nearly every state. Besides the various kinds of light papers, there are other products such as building paper, box board, pasteboard, cardboard, and wall board, which are made throughout the manufacturing states.

The Great Variety of Wood Products. — In addition to the uses of wood already mentioned, there are hundreds of others, only a few of which can be mentioned. An important part of the industry is that known as millwork, including doors, sash, blinds, flooring, and moldings. Shingles, lath, and wooden packing boxes; flour barrels, sugar barrels, and apple barrels by the tens of millions; pork barrels, fish barrels, oil barrels, lard tubs, and butter tubs; pencils, wooden handles, and an almost endless list of miscellaneous articles are still made from wood. In many of these items, however, wood is being replaced by some other material; for example, metal lath, asbestos shingles, and metal barrels, tubs, and pails. A relatively smaller number of wooden buildings are being constructed, and it looks as if we had passed the high point of lumber consumption in this country.

National Forests and Forest Conservation. — Some years ago it became evident that steps must be taken to restrict the reckless cutting of timber, or the American people would soon run short. The methods of lumbering had been very wasteful; it is said that only about one quarter of the wood in the average tree was actually put to use; the rest was wasted in the forest, or in the sawmill, or in the woodworking factory, or elsewhere. In lumbering operations young trees were thoughtlessly ruined, forest fires were

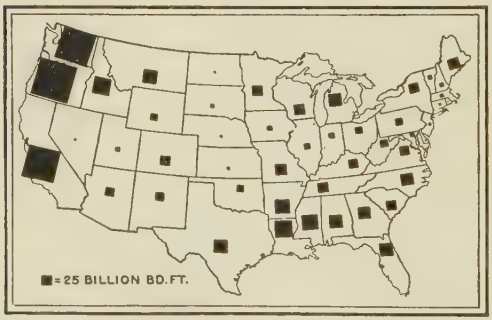


Fig. 86. Comparative amounts of timber still standing in each state. (*U. S. Dept. Agr.*)

needlessly frequent, and other conditions contributed to the waste of our forest resources. People seemed quite unconcerned until the price of lumber began to advance sharply some years ago; then the principle of *conservation* and the proposal to set aside national forests got a hearing. Theodore Roosevelt and men whom he gathered about him gave a tremendous impetus to the conservation movement. Congress passed laws providing that forests on lands still owned by the government might

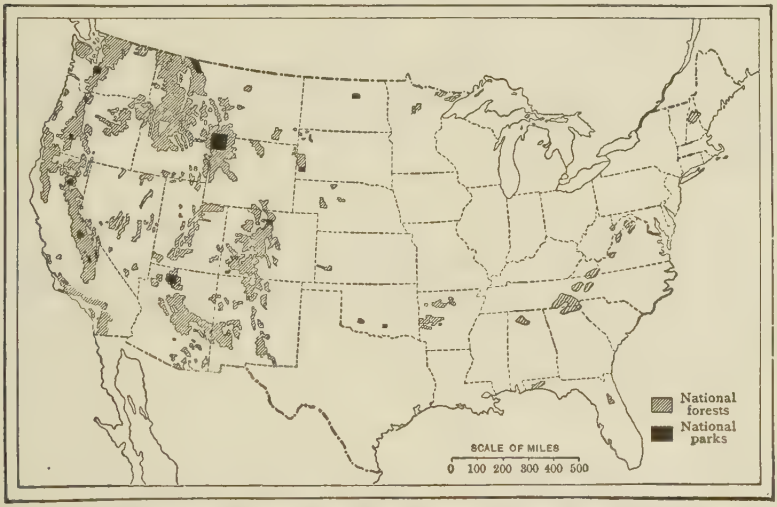


FIG. 87. The national forests of the United States. These are nearly all located in the West, where the government had not yet disposed of all the public land. (*U. S. Dept. Agr.*)

be set off as *national forests*, and be managed, to a degree at least, on the principles of scientific forestry. Forest patrols were established, fire wardens were posted, open forests were leased to cattlemen and sheepmen to be used for grazing purposes, and other steps were taken to preserve the national forests for the use of future generations, while at the same time deriving some return from them. Figure 87 shows the location of the national forests, which have a total area of 200,000,000 acres, or more than the area of France and England combined. Not

all of this land contains good timber, but the greater part of it does.

Some of the states have also taken steps to establish state forests, partly to conserve timber, partly to regulate the run-off of surface waters and prevent floods, and partly to prevent the erosion of soil on steeper slopes, which usually follows the removal of forests. This movement to preserve some of the remaining forests was started none too soon, and much good has been accomplished by it.

NOTE. — Various tree products not commonly found in the United States — such, for example, as rubber, cork, cinchona, and palm tree products — will be discussed in connection with the parts of the world where the trees grow most abundantly.

EXERCISE

It is suggested that part of the class prepare a summary of the foregoing chapter by selecting the main points and writing them out in condensed form; and that other members of the class prepare a set of twenty or twenty-five review questions on the chapter.

CHAPTER VIII

THE FISHERIES OF NORTH AMERICA

Inland Rivers and Lakes as Sources of Fish. — A great deal of sport and a considerable quantity of food result from our inland fisheries, yet the total money value of the product is not large.

From the upper Mississippi and some of its tributaries thousands of tons of clam or mussel shells are annually taken by fishermen who make a desultory business of gathering them. The clam shells are sold to factories in certain towns along the river, and from the shells are cut discs of pearl which are later made into pearl buttons, an industry having an annual value of nearly $5,000,000. Valuable pearls are occasionally found in the shells, and this gives to the work of the fishermen a certain zest that it would not otherwise possess. The possibility of finding a $500 pearl in one of the shells, supplies a degree of pleasurable excitement. Single pearls that sold for $10,000 to $15,000 have been found in these waters.

The fisheries of the Great Lakes are of somewhat more than local importance. Regular fishing boats go out daily in the open season from the shore towns and bring in the day's catch, which is either sold locally or is shipped promptly to city markets. Trout, whitefish, herring, and pike perch are the principal commercial fish caught in these lakes.

Coastal and Tidal-River Fisheries

The Atlantic Coast; Menhaden. — One of the most numerous of the fishes of the Atlantic coast of the United States is the menhaden, a member of the herring family. These fish travel in schools numbering millions, and are caught in enormous numbers along the coast, or a little off shore, all the way from Florida to Maine. They are not used for food, but yield quantities

FIG. 88. Fisheries of the United States.

of fish oil and fish waste, the latter used for fertilizer. More than a billion of these fish have been caught along the Atlantic coast in a single year, yielding 6,500,000 gallons of oil and 90,000 tons of fertilizer. This is a large yet little-known branch of our coast fisheries.

Shad and Alewives. — The shad, like its cousin the salmon, begins life in a fresh-water river or lake, then goes out to sea and lives as a salt-water fish, but returns to the rivers and lakes to

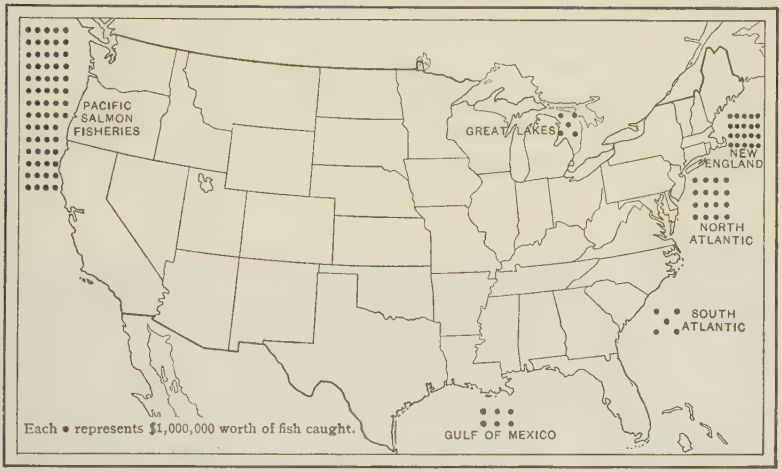


FIG. 89. Approximate average value of fish caught each year in the fisheries of the United States and Alaska.

deposit its eggs. These fish formerly ascended all the rivers of the Atlantic coast between the Gulf of St. Lawrence and Florida, and were caught in great numbers — so great, in fact, that they rapidly diminished, and there was danger that they would disappear from our eastern rivers. They are still caught, but in nothing like the former numbers. Alewives, a less valuable food fish, are now much more abundant on our eastern coast than the shad.

Other Fish. — An idea of the varieties and quantities of fish caught along the coast of our Middle Atlantic States may be

gathered from the following list of fish taken in a single year off the shore of New Jersey.

Variety	*Pounds*	*Variety*	*Pounds*
Bluefish	2,700,000	Mackerel	367,000
Butterfish	5,500,000	Menhaden	4,355,000
Cod	679,000	Scup	3,280,000
Croaker	2,084,000	Sea bass	6,172,000
Eels	378,000	Squeteague	14,121,000
Flounders	1,500,000	Whiting	2,400,000
Total, including miscellaneous			48,000,000 lb.

Crabs and Lobsters. — The catching and marketing of crabs has become a large industry, especially in Chesapeake Bay, where it gives employment to many persons. Both soft-shell and hard-shell crabs are caught to the extent of many millions of pounds a year. Lobsters are taken in diminishing but still large quantities along the coast of Maine and eastern Canada.

Oysters. — The Atlantic and Gulf coastal waters of the United States yield more oysters than all the rest of the world. These shellfish when very young attach themselves to objects on the bottom of the bays, such as stones and old oyster shells, and there they grow for several years. They are found all the way from Texas to Massachusetts, but the chief center of the oyster fisheries is Chesapeake Bay, and Baltimore is the world's greatest oyster market and distributing point. The Pacific coast also has oyster fisheries of considerable value.

It has become the custom to plant oysters in definitely marked-out areas belonging to private persons or companies. These are essentially oyster farms. The United States government, the state governments, and the oystermen themselves have all joined in a systematic effort to increase the oyster supply. The oyster is the leading fishery product in twelve or more states; and the greater part of the 35,000,000 to 40,000,000 bushels of oysters that are obtained yearly is taken from planted grounds.

Sponges. — The sponge fisheries off the coast of southern Florida are rather more interesting than important, although the catch amounts to $1,500,000 a year. The sponges, as we buy

them, are only the framework or skeletons of the living jelly-like creatures. The sponge fishers go out in small boats, and with long-handled hooks remove the sponges from their anchorages, lift them into the boats, and take them on shore, where they are cleaned and prepared for market. Key West is the leading center of this industry in the United States.

The Pacific Coast Salmon. — The Columbia River is the most important river in the world for salmon, but Alaska, with more than a hundred canneries, leads all the other salmon-fishing regions in quantity of fish caught and canned. Puget Sound is another important region, ranking second only to the coast of Alaska. The king salmon grows very large, frequently weighing 20 to 25 pounds, and occasionally three or four times that much. The red salmon are smaller but are more highly prized, especially for canning purposes. During the summer and fall

FIG. 90. Salmon in one of the great canneries on the coast of Alaska.

many thousands of men are employed in catching, dressing, and canning these fish on the Pacific coast of North America, and the annual pack equals or exceeds 7,000,000 cases, each containing forty-eight pounds. So great is the annual value of these fish that salmon stand second only to herring among all the fish of the world.

Owing to the peculiar habits of the salmon, they are an easy prey to man, for they ascend the rivers to spawn, and during the season they come in numbers almost past belief. They are exceedingly powerful swimmers. By means of nets, seines, fish wheels, and other devices the fish are easily caught as they ascend the rivers, and if the laws did not partially protect them the salmon would be in danger of very serious depletion. Even with this protection and with the aid of many fish hatcheries supplying enormous numbers of tiny fish to the streams, there is still danger that our supply of salmon will not be kept up.

The North Atlantic Open-Sea Fisheries

Importance of the Sea Fisheries. — Fish form a valuable item in the diet of nearly all peoples, but the value of the sea fisheries is not measured alone by the amount of food which they supply. All maritime nations encourage fisheries in every possible way, because the fishing fleets are an excellent training school for seamen. In these fleets thousands of boys and men learn the moods of the sea, learn how to handle boats in all kinds of weather, and come to love the sea and the life on it. From these men the merchant fleets and navies recruit many of their best seamen.

The Fishing Banks. — On the continental shelf off the coast of New England and eastern Canada are places where, over large areas, the water is shallow. In these places certain fish collect in large numbers because food is more abundant there than it is in the deeper water; these are the *fishing banks* to which hundreds of fishing vessels from Canadian and American ports resort each season. The largest of these banks are near Newfoundland, Nova Scotia, and Cape Cod (Fig. 91), and

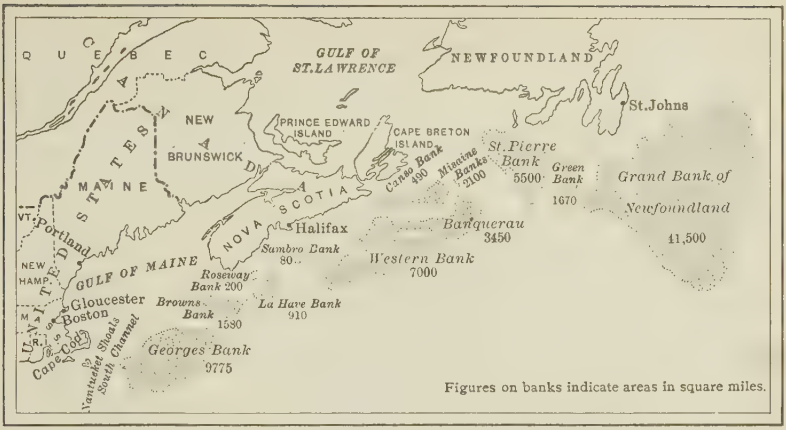


FIG. 91. Fishing banks from Cape Cod to the Grand Bank of Newfoundland, with the area of each in square miles. (*U. S. Bureau of Fisheries.*)

the most important fish caught on the banks is the cod, caught with lines to which a great many baited hooks are attached. Other fish caught there include the halibut, hake, and haddock.

New England Fisheries. — Fishing is more successful and more profitable in cool waters than in warm waters. All the most important fisheries of the world are in northern seas; the fish in these waters are superior in quality, and in the cool climate they keep better while being marketed. The New England states — especially Massachusetts and Maine — have long been famous for their fisheries. Gloucester, Boston, and Portland are the chief fishing ports; the fleets from these cities bring in between 150,000,000 and 200,000,000 pounds of fish a year, including both those from the banks, and the herring, mackerel, and others caught in seines. A part of the fish are salted and dried and are thus marketed both at home and abroad, especially in the Catholic countries. Many are put up in tin cans, as for example kippered herring, sardines, and lobsters. Some are packed in brine in kegs and half-barrels; some are smoked (herring and halibut); and still more are iced and shipped fresh to markets perhaps hundreds of miles away.

The fisheries of the United States are more valuable than those of any other country, but those of Great Britain, Japan, Russia, Canada, Norway, and France are also extensive.

Whale Fisheries. — For a long period whale fishing formed one of the most interesting and profitable marine activities of the fishing nations. The countries of western Europe and the United States had hundreds of vessels and thousands of men engaged in this most exciting and dangerous of all forms of hunting. Whales are most numerous in the cold waters of the far North. There are a number of varieties, but the sperm whale was most sought after. The whale is an air-breathing mammal, not a fish, and since it must breathe atmospheric air, it lives at or near the surface of the sea, and so is liable to capture.

New Bedford, Massachusetts, was the most famous of all whaling ports, the home port of several hundred whaling vessels that annually brought back great quantities of whale oil, sperm oil, and whalebone. The sea captains of New Bedford made fame and fortune on the northern seas, and they and their sturdy men enacted one of the most thrilling chapters in the history of the American fisheries.

The whalers cruised about in the northern waters until the lookout in the crow's nest spied a whale; then at once the boats were lowered and several crews stole cautiously upon the whale. In the earlier days, the harpoon (spear) was hurled by a powerful sailor; later it was shot from a special gun mounted on the bow of the boat. A long, strong line was attached to the harpoon. As soon as the whale was struck he plunged downward with terrific speed and violence; often two, three, or four lines had to be joined together, for the frantic animal had to be given all the line he would take, or the boat would be engulfed. Sometimes the whale did not ascend for thirty or forty minutes, but the whalers knew he would have to come up for air and they usually succeeded in dispatching him when he reappeared, but not without a battle. Frequently the enraged monster plunged among the boats, overturned them, and drowned some of the men. In 1845 the New Bedford whaling fleet brought in 158,000 barrels of sperm oil, 272,000 barrels of whale oil, and 3,000,000 pounds of whalebone. The whale oil had many uses, but was especially used as a lubricant, and in crude lamps to give light. With the discovery of petroleum and of substitutes for whalebone, the whale fisheries declined, but they still exist.

FIG. 92. A New Bedford whaler of earlier days.

Summary

The fisheries of the United States are more valuable than those of any other nation; this is partly due to the very long coast line of the country. The actual value of the fish caught is not large; it is, for example, far below the value of the eggs produced in the country. Sea fisheries are encouraged by all maritime nations because they form a training school for the sailors who are needed on merchant ships and warships.

In the lower courses of the rivers of our Atlantic states, shad, alewives, and other fish are caught. Great quantities of crabs and oysters are obtained along the Atlantic coast, notably in Chesapeake Bay. Lobsters are trapped on the Maine coast and in eastern Canada; sponges are caught off the coast of Florida, and great quantities of menhaden are taken along the Atlantic coast and are converted into oil and fertilizer. On the Pacific coast from California to Alaska, salmon are caught and canned to the extent of 400,000,000 pounds in a season. The North Atlantic open-sea fisheries are carried on mainly by the New England and the Canadian fishing fleets. On the shallow "banks" great schools of fish collect at certain seasons because of abundance of food; cod, herring, and mackerel are the most numerous, and Boston, Gloucester, and Portland are the chief fishing ports.

Exercise

1. Why are fishing and fisheries of more importance than the mere food value of the fish would indicate?
2. Why is the clam gathering of the upper Mississippi very interesting?
3. Why are menhaden caught? Where?
4. Why have the shad in eastern rivers so greatly diminished?
5. Why is the oyster industry of our Middle Atlantic coast sometimes referred to as oyster farming? In what waters especially?
6. Why can oysters, lobsters, clams, and sponges be taken only in shallow waters?
7. Why do salmon come in from the sea and go up the rivers at certain seasons? Where, in greatest numbers?
8. Why do fish collect in great numbers on the fishing banks?

CHAPTER IX

MINERALS IN THE ECONOMIC LIFE OF THE NATION

The Importance of Minerals in Modern Civilization. — The present age differs from preceding ages in the great use of power-driven machinery and agencies of transportation, both of which are largely made of metals. People of ancient times used several of the metals in a limited way, but a great increase in the use of metals has taken place since the invention of the steam engine in the latter part of the eighteenth century. The world has gone forward in material progress, since that invention, more than in all previous time. Machines, and the engines that drive them, are made mainly of steel, and are driven largely by the energy of coal.

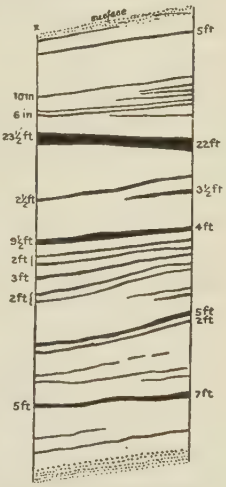


FIG. 93. Cross section of coal measures.[1]

THE MINERAL FUELS

Coal

Origin and Occurrence. — Coal is of vegetable origin; beds are found in all stages from *peat* in the present swamps, through various grades of *lignite* and *bituminous coal* up to *anthracite*, or hard coal. It is believed that all coal beds were originally loose accumulations of partly decayed vegetable matter, such as now collect in swamps like the Dismal Swamp. After the first deposits were laid down many layers of rock material, interbedded with coal, were deposited, and now rest upon the earlier layers, building up a great depth of rock formations called the *coal measures* (Fig. 93). In the coal

[1] The black bands show the relative thickness of coal layers in North Dakota.

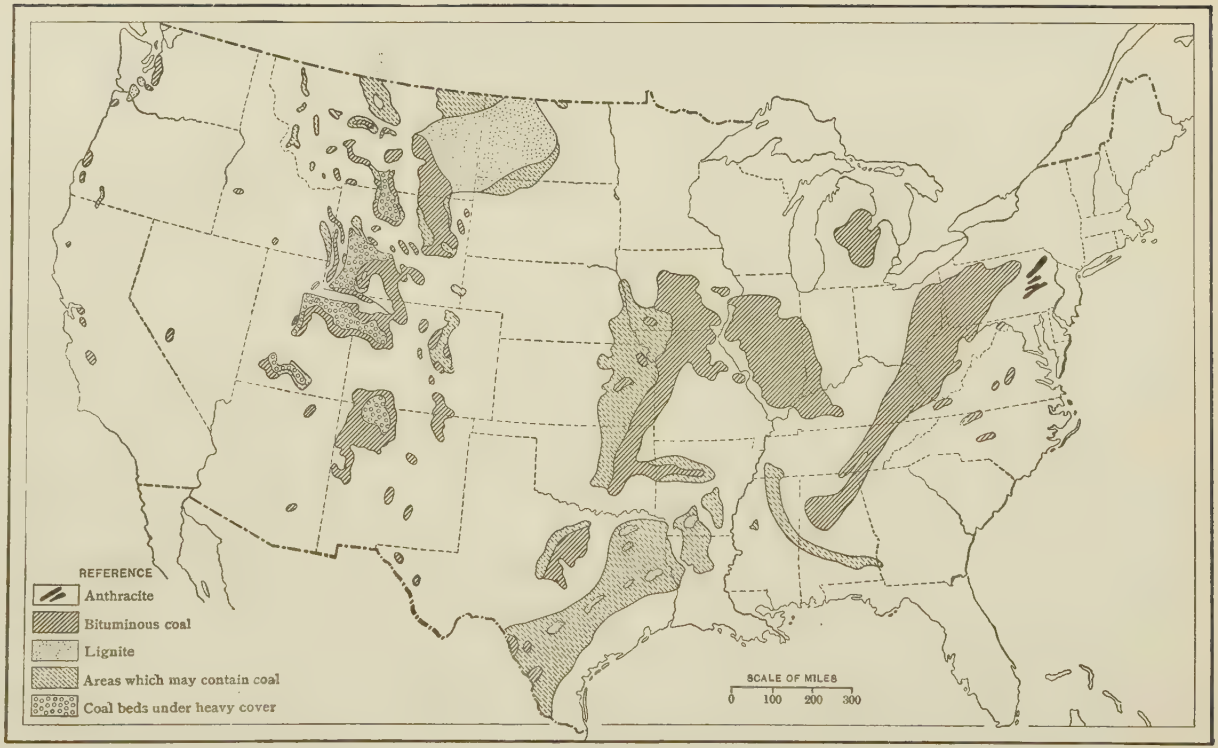


FIG. 94. Coal fields of the United States. (*U. S. Geol. Survey.*)

measures, the seams of coal — ranging from the thickness of cardboard to fifty or more feet — alternate with layers of rock which are usually much thicker than the layers of coal. In some coal fields the coal beds lie in nearly horizontal layers, either near the surface or at varying depths below. In other cases the coal measures have been wrinkled into great folds, have been eroded by streams, and have suffered other changes. This is true of the anthracite beds of eastern Pennsylvania (Fig. 96). Since coal must be mined by laborers working in the mines, only those layers that are at least a few feet in thickness can be conveniently worked. About two thirds of the coal mined in the United States is taken from seams ranging from four to eight feet thick.

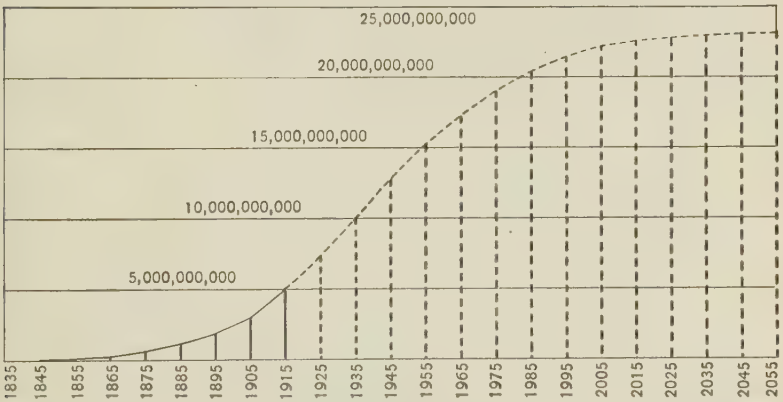
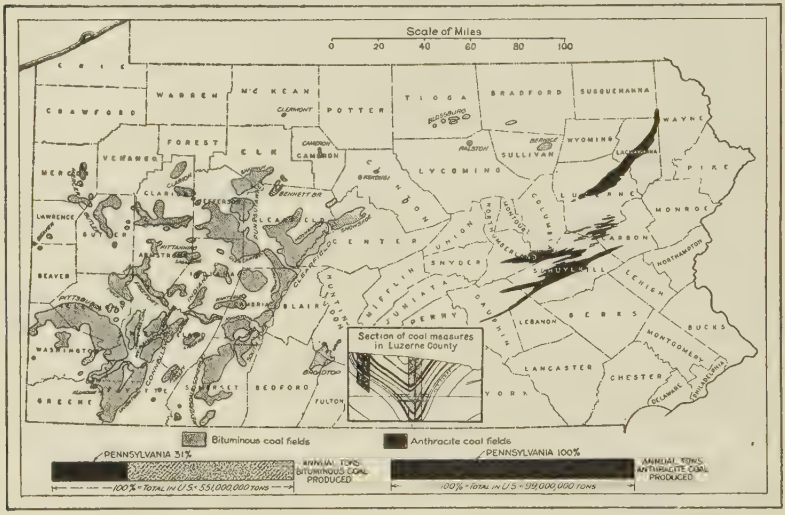


FIG. 95. Estimated production of coal in the United States, in tons for each decade, from 1835 to 2055. (*After E. W. Parker.*)

Resources of the United States. — It is impossible to understand what it means to the American people to have the almost unlimited wealth of coal which this country possesses; it is mined in thirty different states, and half of all the known coal of the world is in the United States.

Pennsylvania anthracite. In eastern Pennsylvania, in a relatively small area (480 sq. mi.), is the anthracite or hard coal region, and from this small area practically all the hard coal

mined in the United States is obtained. Over 3,000,000,000 tons have already been taken from the anthracite mines, and a still greater amount remains, but the supply is limited, and cannot last many generations at even the present rate of consumption.



Courtesy of Samuel S. Wyer

FIG. 96. The coal deposits of Pennsylvania. (*Based on data from the U. S. Geological Survey.*)

High-grade bituminous coal. Our most important soft coal field is known as the Appalachian field; it extends 850 miles from north to south, reaching from western Pennsylvania to northern Alabama, and averages nearly 100 miles in width (Fig. 94). This coal is of high quality, exceedingly abundant, and cheaply mined. The mines of western Pennsylvania and West Virginia are the leading producers in the United States, and the coal from the Connellsville region, near Pittsburgh, makes the best *coke* of any of our coals. Coke is the most satisfactory fuel for smelting iron ore, and the excellence of the Connellsville coal for making coke has been the main factor in locating our greatest iron and steel industries in the Pittsburgh district. Coke is made by partly burning soft coal in coke ovens into which little air is

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Fig. 97. Steam shovels stripping off the soil and rock and digging coal near Danville, Illinois. Much more frequently coal is mined by underground workings. Iron ore, however, in the Lake Superior region, is also mined with steam shovels in this way.

admitted; the heat drives off the gases contained in the coal, and leaves nearly pure carbon. There are many grades of soft coal that cannot be used for making coke.

Our next important coal field is the Interior field, including the greater part of Illinois, extending into Indiana and Kentucky, and appearing again west of the Mississippi, with a detached area in Michigan (Fig. 94). The coals gradually decline in quality from east to west in these fields. In the Rocky Mountains, mainly in Colorado, coal of good quality is obtained, and 2,000,000 to 4,000,000 tons a year are also mined in Washington, the only Pacific Coast state that produces coal to any extent.

Lower grades of coal. There are enormous areas of low-grade coal — mostly *lignite* — in the West and South (Fig. 94). As a rule this coal is soft, crumbles rapidly upon exposure to the air, and cannot profitably be shipped very far. It is now used only near the mines, but in the future when the higher grades of coal are depleted, these vast areas of low-grade coal will prove of value. In Europe such coals are made into briquettes, and are extensively used for fuel. It is also an easy matter to produce fuel gas from such coal and this gas can be piped long distances if necessary. Gas is such an ideal fuel that its use is sure to become more and more common.

Relation of Coal to Our Great Industrial Development. — The United States produces more coal than any other three nations combined, and in the recent past has produced 40 per cent of the world's supply. The high quality and the great quantity of the coal in this country, and the relative ease with which it is mined, have all combined to give the United States a leading position among the industrial nations. The energy of coal burned in an efficient engine is surprising: a pound can do as much work as a man can do in a day; an ounce will draw a ton a mile on a level railroad track. Fuel is one of the most important factors in manufacturing and transportation, and with the aid of abundant and inexpensive coal, the United States has quickly become the foremost manufacturing and transporting nation. The work performed by steam-driven

engines and locomotives in the United States is estimated to be at least twenty times as great as the manual labor performed by all the people. The industrial progress of the United States has been greatly aided by the fortunate location of our best coal in the eastern part of the country, the section that first needed it and that could best utilize it in manufacturing goods for export. A large proportion of the wealth that has been produced in the United States in the last fifty years represents the earnings of our industrial plants, whose machinery is mainly driven by the energy of coal.

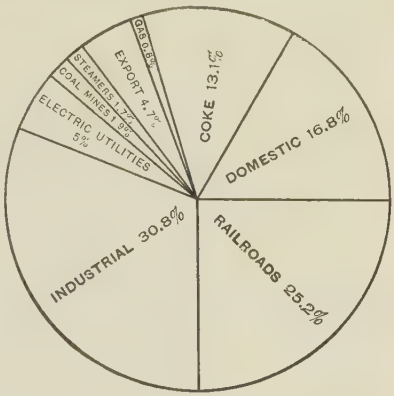


FIG. 98. What becomes of our coal; percentage used for each purpose.

Coal in Other Countries. — Before the World War, Europe produced over half the coal mined in the world, but the dis-

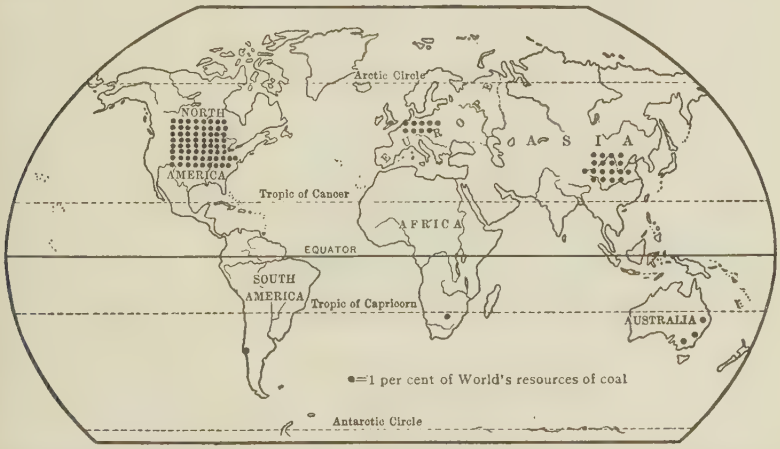


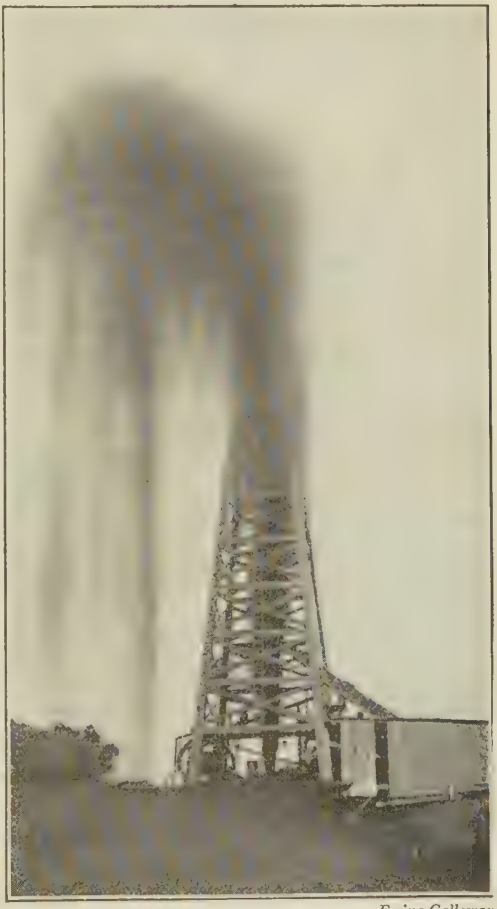
FIG. 99. The world's estimated coal resources, by continents. Of the 67 per cent in North America, about three fourths is in the United States, and half of it is lignite.

organized conditions which followed the war greatly reduced the output. Great Britain and Germany are the largest producers of coal in Europe, each producing about as much as Pennsylvania. China has large deposits of coal, but relatively little is mined as yet. Japan is the largest present producer in Asia, but her resources are not large. Africa is not known to have very much coal, while South America has still less. Australia mines more than enough for her own needs and has larger reserves than any other part of the southern hemisphere. Canada has coal of good quality in the extreme east and extreme west, but none in the most thickly settled province, Ontario. Asia, Africa, Australia, and South America all together do not produce so much coal as the single state of Pennsylvania.

Petroleum and Natural Gas

Origin and Production of Petroleum. — It is probable that petroleum and natural gas originated from the decomposition of organisms — both plant and animal — which were buried long ago in the sediments that afterward became rocks. The oil and gas are confined in the pores or other small cavities of porous rock which is overlain by a roof of impervious rock, and this roof prevents their upward escape and loss. Only where the oil is thus prevented from escaping are oil "pools" now found. An oil well is drilled through the roof rock into the oil- and gas-bearing rock below, and then the imprisoned gas may drive the oil violently upward, producing a "gusher" (Fig. 100). Gushers in Texas and Mexico have yielded upwards of 100,000 barrels a day for a short period. As a rule such wells soon spend their force, and thereafter must be pumped. While a small proportion of wells yield thousands of barrels a day, they soon decline; many wells must be pumped from the first; and the average production of all American wells is less than five barrels a day. Some of the most famous producers of Mexico have ceased to yield oil and their product has changed to salt water almost over night. A great many wells that are drilled never yield any oil at all.

Petroleum Fields of the United States. — (1) The first petroleum discovered in the United States was found in western Pennsylvania in 1859, and for several decades that state was the leading producer. Two counties in Pennsylvania had over 33,000 productive wells. Gradually new oil districts were found in West Virginia, Ohio, Kentucky, and Tennessee (Fig. 101). This large and highly important field, referred to as the Appalachian, has produced oil for over sixty years, and new wells are still being drilled in it, though the production has remained nearly stationary since 1900.



Ewing Galloway

FIG. 100. An oil gusher in Mexico. This well produced 60,000 barrels a day for several weeks.

(2) The next field toward the west is situated around Lima, Ohio, and extends across the boundary into Indiana. This field has declined since 1905, and is no longer important.

(3) Illinois was a large producer some years ago, and is still producing, but at a declining rate.

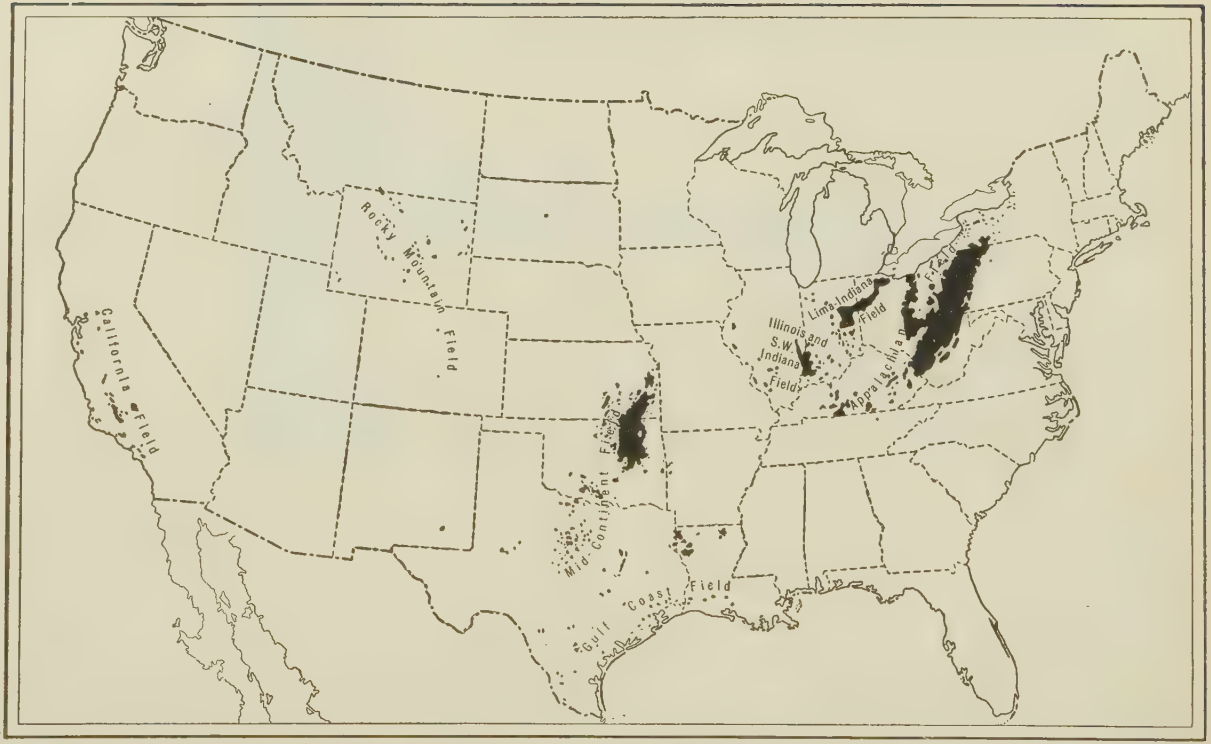


FIG. 101. Principal petroleum and natural-gas fields of the United States. (*U. S. Census Bureau.*)

(4) Southern California has yielded an enormous amount of oil since it began producing about the year 1900. It competes with Oklahoma for first place, each state having produced over 100,000,000 barrels a year for a number of years.

(5) The leading field in 1923 was the Mid-Continent, lying in Oklahoma, Kansas, and northern Texas. This field has yielded more than 200,000,000 barrels a year.

(6) In Texas and Louisiana are several oil districts, quite widely separated, which include some of the largest producing wells that have been drilled in the United States, and the combined output of these scattered fields has been very large.

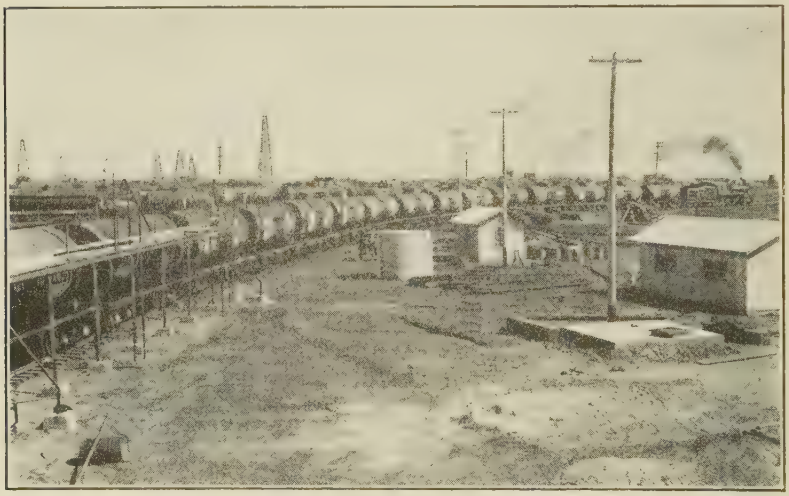
(7) In the Rocky Mountain area, oil is being obtained in increasing quantity, with Wyoming as the leading state.

In 1923 the United States was producing at the rate of 500,000,000 barrels yearly; this was nearly two thirds of the world's total production. At that date the Mid-Continent field alone was yielding nearly as much oil as the rest of the world outside the United States.

Exhaustion of Our Oil Resources. — In 1920 it was estimated that one half of the oil resources of the United States had been used. This estimate probably was too large, for new fields will be discovered; yet the country has been so thoroughly explored for evidences of oil that it is not probable that many important fields have been overlooked. We are consuming our petroleum with great rapidity, and its exhaustion seems only a few decades off. Then we must get it from distant lands at higher cost, and eventually a substitute must be found.

Petroleum Products. — Petroleum is of two distinct types, one known as *light* oil and the other as *heavy* oil. The former yields more of the lighter products such as kerosene and gasoline, while the heavy oils yield more of the denser products such as asphalt, tar, and lubricating oils. The oils from the eastern United States are light, and most of the western and Mexican oils are heavy. Hundreds of products are made from petroleum, the most important of which are kerosene, gasoline, fuel oil, and lubricating oils. Great quantities of crude oil are now burned

under the boilers of locomotives and other engines. Most of the new war vessels and an increasing number of passenger and freight steamers burn oil. Not only is it more convenient than coal, but a ton of it contains far more heat units. It is scarcely necessary to point out the tremendous importance of gasoline in making possible the automobile, motor truck, and airplane with all of their revolutionary effects in peace and in war. So important is petroleum that the great nations of the world — especially Great Britain and the United States — are making strenuous efforts to get control of new oil fields all over the world.



Brown Bros.

FIG. 102. A train of tank cars containing crude oil leaving a large oil field. Over 60,000 such cars are in use in the United States.

Transporting and Refining Petroleum. — The great amount of oil to be transported and the need of the cheapest and most efficient means of moving it, have gradually brought into use highly specialized methods of transportation, including the tank ship, tank car (Fig. 102), and tank wagon or truck. These are usually owned by the large oil companies, and are used by them

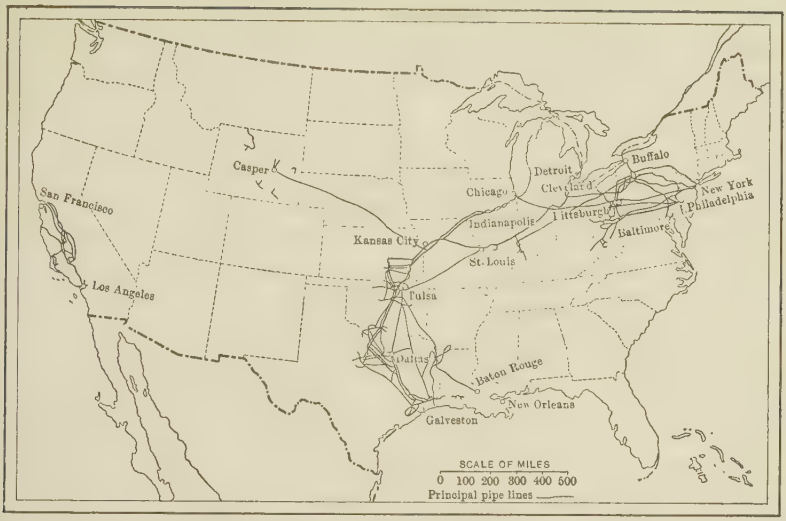


FIG. 103. Principal pipe lines of the United States. They connect the oil fields with the refining centers and exporting points.

in distributing their products. But of all the special facilities for transporting oil, the pipe line is most significant. By means of powerful pumps placed at intervals of fifteen to thirty miles along the pipe line, the oil is pumped from the inland fields to the refining centers and to the seaports. One line extends from Oklahoma to Illinois and thence to the Atlantic coast (Fig. 103). All together there are tens of thousands of miles of these pipe lines belonging to the great American oil companies. The pipes are usually from six to ten inches in diameter, are placed underground, and go up hill and down as they cross the country.

There are more than 400 refineries in the United States, and they are widely distributed so as to serve the various oil fields. The greater number of these belong to about ten companies. Some of the largest are near the coast of Texas and Louisiana, in California, on the New Jersey side of New York Bay, at Philadelphia, and near Chicago.

In the refinery the crude oil is subjected to heat and to a variety of processes, by means of which the various products are separated and prepared for market. By a recently discovered process known as "cracking," the heavy oils have been made to yield much more gasoline than they yielded by the older processes of refining, and gasoline is the product most in demand.

Exportation of Petroleum Products. — Since the United States produces over 60 per cent of the world's petroleum, and also refines or handles part of the Mexican output, our foreign sales of petroleum products are very large. We sell abroad each year something like 3,000,000,000 gallons of mineral oils and gasoline, worth upwards of $500,000,000, making petroleum products one of our largest exports. This is one of the products of international trade which the United States largely controls. The wonderful system of transporting and selling which the great oil companies have built up reaches practically every part of the world in which civilized people live. The traveler sees Standard Oil cans in the interior of China, Siberia, South America, and other distant lands. Tank ships traverse every sea, and the storage tanks of American oil companies are seen in scores of foreign ports.

Natural Gas. — Petroleum is very seldom found without natural gas, but gas is often found in the earth without the accompaniment of petroleum. Our largest source of natural gas is the northern portion of the Appalachian oil field, including parts of New York, Pennsylvania, West Virginia, Ohio, Kentucky, and Tennessee (Fig. 104). The other region of large production is the Mid-Continent oil field, mainly in Kansas and Oklahoma. The California oil field is not a large gas producer, nor are some of the other American oil fields, although gas is obtained from all of them.

Owing to the difficulty of confining and storing gas, enormous quantities have been wasted. It is said that during a period of many months the waste of gas in one state was equivalent to the fuel value of a ton of coal per second. In some gas and oil fields, gas was allowed to escape through pipes into the air, where it

burned day and night, month after month. Natural gas is a very convenient fuel, and near the source of production has been very cheap. A few years ago 17,000 industrial plants and 2,500,000

Courtesy of Samuel S. Wyer

FIG. 104. Main pipe lines for transmission of natural gas in Pennsylvania and adjacent states.

homes were using this fuel; its value is more than that of all the gold and silver produced annually in the United States.

Petroleum in Other Countries. — At present a very large source of oil is a region near the Gulf coast of Mexico (Fig. 105). This field is a marvel because of the astonishing production of some of the wells. Until the World War, Russia was the second largest producer of petroleum, but the Russian fields — near the Caspian Sea — are yielding much less than formerly. Oil fields of great promise exist in the region between the Caspian Sea and the Persian Gulf, and their existence is one of the reasons for Great Britain's desire to control Mesopotamia and parts of Persia. On both the north and west coasts of South

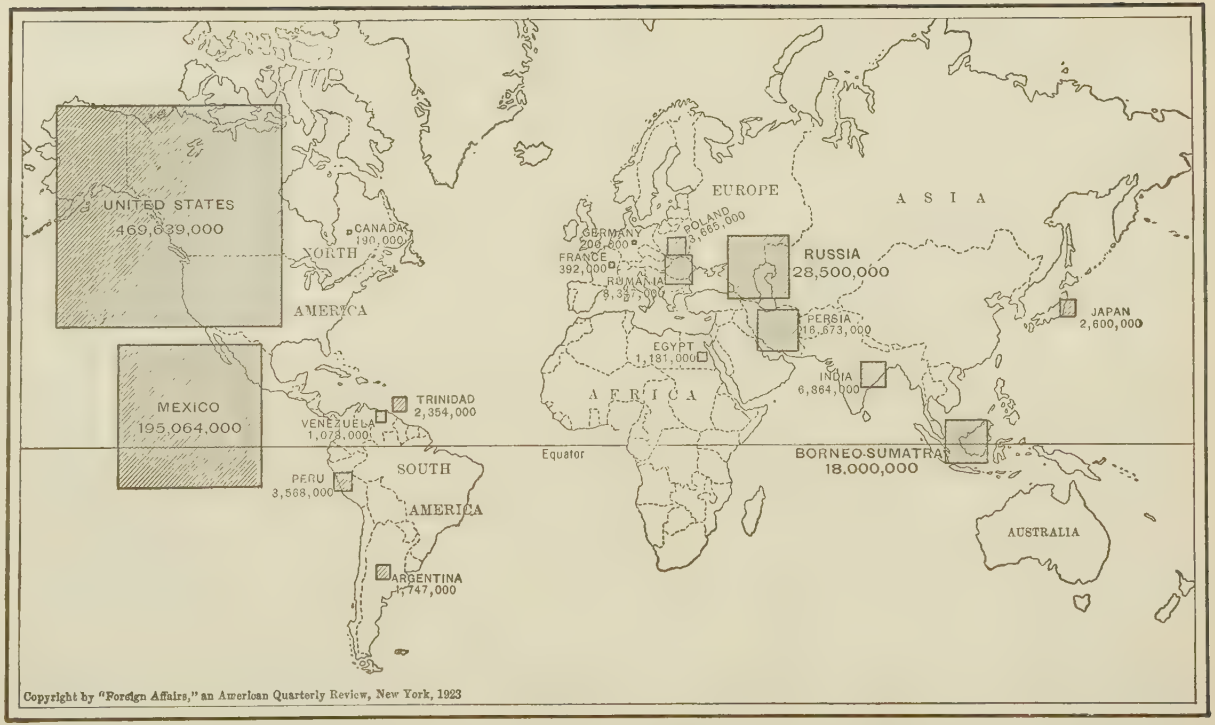


FIG. 105. The world's production of petroleum in one year; the number of barrels of petroleum produced by each country. The areas of the squares are proportional to the production.

America, oil is now being obtained, and large reserves are believed to exist there. The discovery of oil in the far north of Canada is reported. Japan, the East Indies, Rumania, Poland, and a number of other countries are also producers of oil, though in small quantities compared with the production in the United States or Mexico.

The Metals

Iron

The Importance of Iron and Steel in Modern Life. — The present age, as already stated, is one of power-driven machinery, locomotives, and ships, all of which are in large part made of iron and steel. It is an age of the steel printing press, steel farming machinery, steel mining machinery, steel sawmills and flour mills, steel railroads, steel bridges, and steel-frame buildings. Enter any great manufacturing plant and you see about you steel machinery on every side. Every year sees new uses for steel, and the human family grows daily more dependent upon it. In the middle of the eighteenth century, even Europe, the most highly developed of the continents, produced annually only two pounds of iron per capita; in a recent year the United States produced 800 pounds per capita.

Iron in Nature. — Iron is very abundant in the earth's crust, but much of it is so widely distributed in minute particles throughout the rocks and soils that man cannot profitably obtain it. The yellow, brown, and red colors so common in soils, are due to iron compounds which they contain. Meteorites, which occasionally fall to the earth from outer space, are in many cases nearly pure iron, indicating a probability that iron is abundant throughout the universe. The great weight of the earth as a whole, and its magnetism, cause many to believe that iron is a principal constituent of the inner portion of our globe. The two most abundant ores of iron are *hematite* and *magnetite*, the former being much the more important.

Iron Deposits of the United States. — Iron ores are found in many parts of the United States, but in a majority of them the

iron is mixed with earthy substances and forms too small a proportion of the ore to make mining profitable. In this country we seldom mine ores that contain less than 50 per cent iron, and the best ores run from 60 to 70 per cent iron. Iron ores are mined in our eastern mountains in northern New York, New Jersey, Pennsylvania, and southward into Alabama, which state ranks third in iron ore production. Excepting Alabama, which pro-

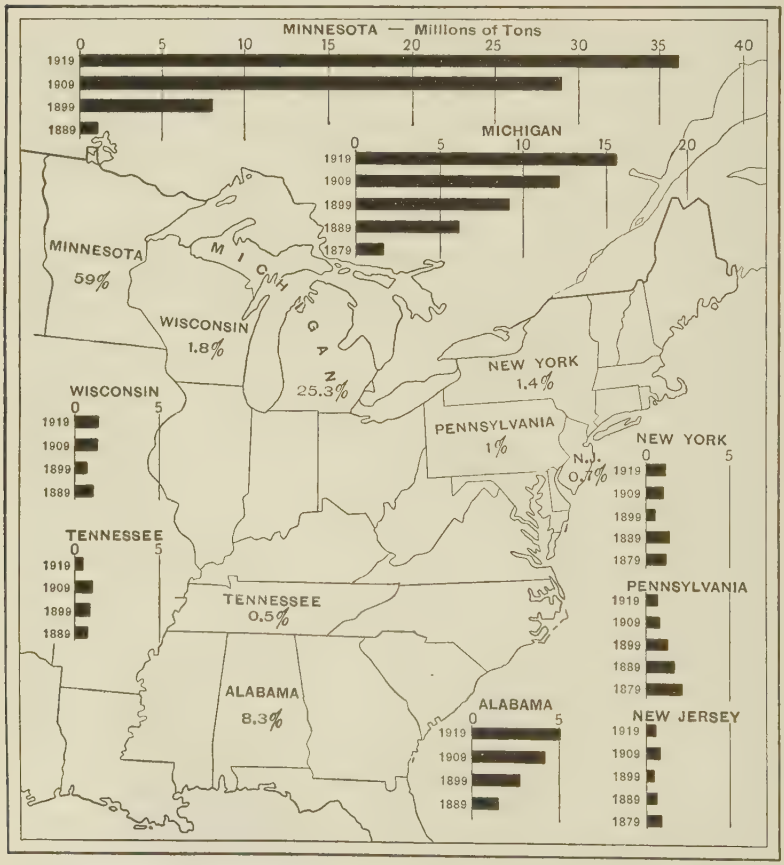


FIG. 106. Production of iron ore, by states, in the United States.

duces 8 to 10 per cent of our iron ore output, no state outside the Lake Superior district produces as much as 3 per cent of the total iron ore mined in the United States, and less than 2 per cent is mined west of the Mississippi River. Pennsylvania, once a leading producer, now yields very little.

Iron Mining in the Lake Superior District. — In the ancient rocks near Lake Superior, in northern Michigan, Wisconsin, and Minnesota, are the most productive iron mines in existence; they produce nearly one third of the iron mined in the world, and over 80 per cent of all that is mined in the United States. The principal ore bodies are in Minnesota, where the ore is near the surface of the ground, and a large part of it is mined by simply stripping off the glacial drift, shoveling up the soft ore with powerful steam shovels, and loading it into cars (Fig. 97). Nowhere else is ore mined so easily or so cheaply. Of the four iron ranges in Minnesota, the *Mesabi Range* is the most important. Its ores are mined by the open pit method mentioned above, and this range yields from 50 to 60 per cent of the iron ore mined annually in the United States.

Some of the mines of the Lake Superior district, like most of those elsewhere, are underground workings. A large smelting and steel-making plant has been built at Duluth to utilize some of the Lake Superior ore, but most of the ore is shipped eastward by lake steamers to be smelted, for there is no coal near Lake Superior.

Importance of the Great Lakes to the Steel Industry. — It happens that our greatest iron mines are a thousand miles from the region where our best coking coals are mined. It also happens that the Great Lakes extend most of the distance between these iron mines and coal mines, and the lakes make possible very cheap transportation between the two. Nearly all the iron ore moves eastward to the coke, (1) because the smelting plants and steel mills were first established in the East, and they tend to remain there; and (2) because the greater part of the steel is sold in the northeastern quarter of the country. The greatest steel-making region is the Pittsburgh district, which

includes towns for a hundred miles or more around; but iron and steel are also the dominant materials used in the industries of most of the cities on or near the Great Lakes (Fig. 149).

Remarkable Development of Facilities for Handling Ore. — The great demand for steel has led to a remarkable development of special machinery and other facilities for mining and handling the Lake Superior ores. These

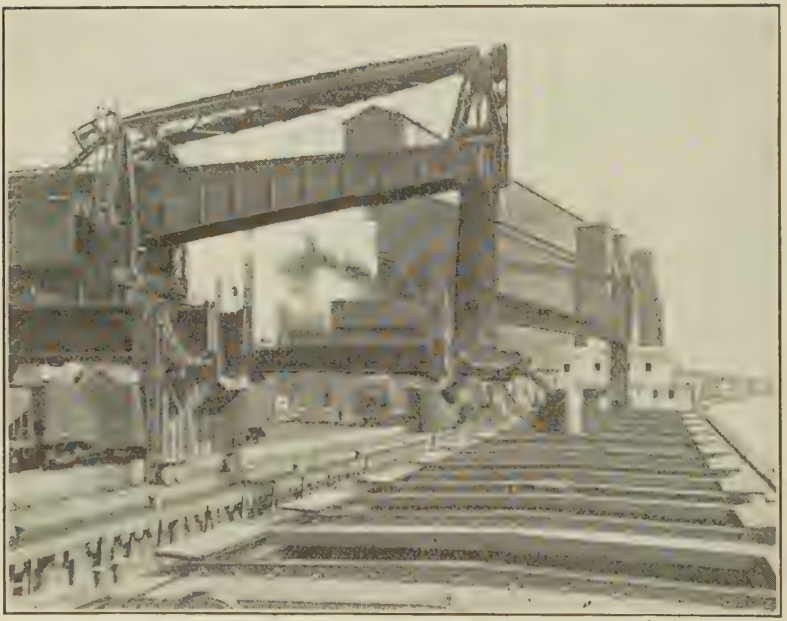


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FIG. 107. Powerful unloaders transferring iron ore from a lake steamer to railway cars at Buffalo.

facilities include (1) the powerful steam shovels that dip up several tons of ore at a bite (like the shovels in Fig. 97); (2) specially designed self-dumping steel ore cars that carry ore to the docks; (3) enormous storage and loading docks at Lake Superior ports, capable of loading a 10,000-ton ship in an hour or two; (4) specially designed steel steamships of great size, built so as to permit rapid loading and unloading (Figs. 107, 122); (5) powerful and ingenious machinery for unloading the ore from the ships and loading it into cars that carry it to Pittsburgh or elsewhere for smelting (Fig. 107).

So efficient are all these facilities that the thousand miles which separate mines and smelters are no serious obstacle to steel production in the United States. The large ore vessels carry ore at the extremely low cost of one twentieth to one tenth of a cent a ton-mile, and still they earn nearly $1,000 a day during the seven or eight months that the lakes are open.

The manufacture of steel. — Iron ore is smelted in tall blast furnaces, into the top of which iron ore, coke, and limestone are fed (Fig. 108). The

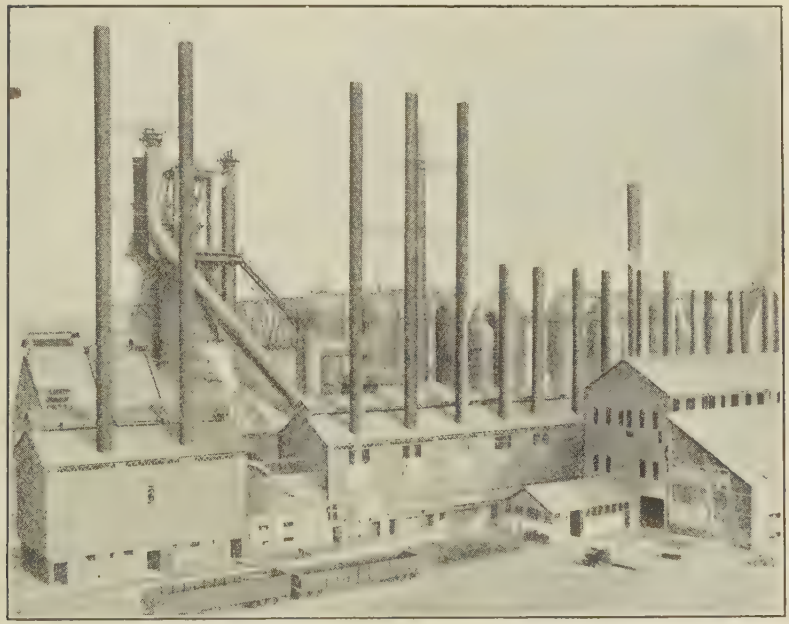

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FIG. 108. Steel works at Cleveland, Ohio.

coke forms the fuel which burns and produces great heat. The limestone acts as a flux, that is, it unites with the nonmetallic part of the ore and liberates the iron. The melted iron settles to the bottom, and when drawn off is either (1) run out into molds in which it hardens to form "pigs," or (2) taken while in a molten state to the Bessemer converter or to the open-hearth furnace to be converted directly into steel.

The manufacture of steel and steel products is one of our largest industries, and the products reach into the billions of dollars annually. So

fundamental is the steel industry that its output is reported weekly throughout the country and has come to be regarded as the barometer of industrial activity. The largest business organization in the world, having assets of over $2,000,000,000, is the United States Steel Corporation.

Our Chief Steel-Making Centers. — The majority of the steel-making centers of the United States are in Pennsylvania and Ohio and on the shores of the Great Lakes. Before the Lake Superior iron ores were discovered, the iron mines of eastern Pennsylvania were the leading producers of the United States. After the Lake Superior ores were discovered and coke came into use for smelting the ore, western Pennsylvania became the chief steel center for reasons already explained. Gradually other steel-making centers grew up in Ohio, at South Chicago, Gary, Milwaukee, Duluth, and in several other cities on or near the Lakes. Important centers also exist in eastern and central Pennsylvania, in Maryland, and at Buffalo (Fig. 149).

At Birmingham, Alabama, coal, iron ore, and limestone are all found in the same valley, and this city is another of the iron and steel centers of the United States. A steel industry of considerable importance has also been built up in Colorado, utilizing coal and iron obtained in that state.

Iron Ore Resources of Other Countries. — Iron ore is more widely distributed over the earth than is coal; but since coal (coke) is the fuel generally used for smelting ores, iron ore deposits which are situated far away from coal cannot be extensively used until cheap transportation is available. In several parts of the world there are very rich iron ore deposits situated far away from coal, as in the case of the wonderfully rich deposits of Brazil and of northern Sweden. Cuba, Chile, and Mexico all have large and valuable iron resources, but have not the coal suitable for smelting the ore. Newfoundland has large iron ore bodies, also Spain, France, England, Russia, China, and many other countries. Germany is deficient in iron since her losses of territory following the World War. Japan is another important nation that is deficient in iron, and is very anxious to get control of iron ore bodies in China.

In general, it may be said that a nation's position among the powers of the earth is very nearly in proportion to the development of its iron and steel industries. The four great powers — the United States, Great Britain, Germany, and France — manufactured over 85 per cent of the steel products of the

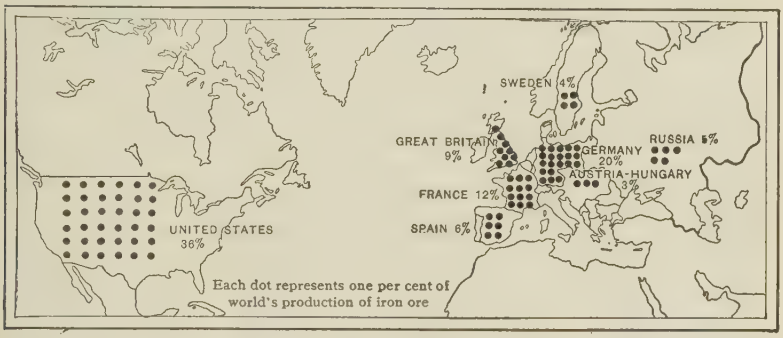

FIG. 109. Percentage of the world's supply of iron ore produced by each of eight leading countries in 1913. After the war, the production decreased in Russia and Germany, and increased in the United States and France.

world prior to 1914. Great Britain and the United States together manufacture over 60 per cent of the steel products of the world.

Metals Other than Iron

Copper. — The United States produces about 60 per cent of the world's copper. With the exception of the rich deposits in the northern peninsula of Michigan and minor deposits in Tennessee, nearly all of our copper is mined in the West. Arizona is the leading state, at times producing as much copper as Europe, Africa, and South America combined. It is a notable fact that the Butte district of Montana and the mines of northern Michigan had yielded half of all the copper mined in the United States up to 1922. Another rapidly rising copper district is Bingham, Utah, while Nevada, California, New Mexico, and Alaska are also important producers.

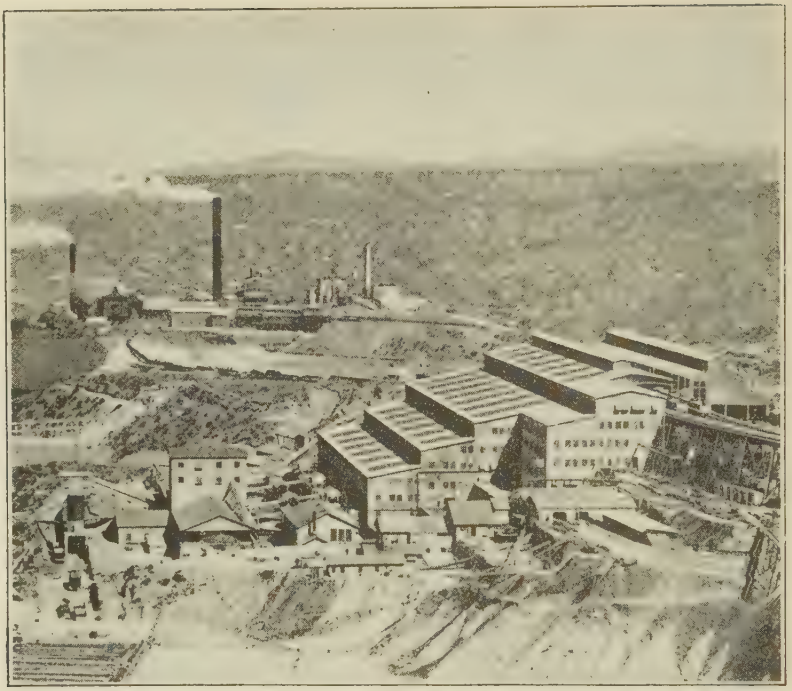

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FIG. 110. Copper concentration plant; a smelter at one of the copper mines of Arizona, the leading copper-producing state of the Union.

The copper export trade of the United States is very large, since this country mines the greater part of the world's copper and besides refines a great deal that is produced in Mexico and South America.

Next to the United States, Chile and Japan are the countries that produce the largest amounts of copper (Fig. 111). In Europe the leading producers are Spain and Germany; but in addition to these countries that are conspicuous in their output of copper, many others, including Canada, Australia, Mexico, and Peru, contribute considerable amounts to the world's supply of this metal.

Copper is extensively used in electrical apparatus because it is a good conductor of electricity; it is also a component of brass and of bronze. The annual value of the copper produced in the world is greater than that of any other metal except iron, and is more than that of gold and silver combined.

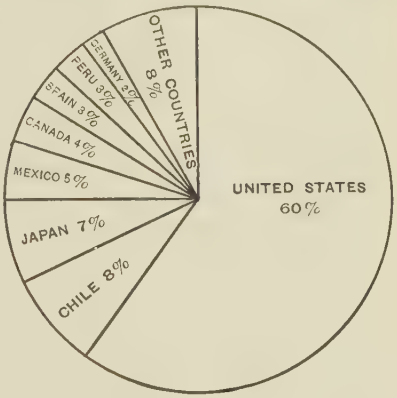

FIG. 111. Percentage of the world's annual output of copper produced by each country.

Gold and Platinum.—Since the dawn of history gold has been a highly prized metal, widely used as money, on account of its scarcity, its color, its resistance to corrosion, and the ease with which it is worked. However, platinum is still more scarce and more valuable; an ounce of gold is worth about $20, but since 1910 an ounce of platinum has been worth from $40 to $150 or more. Like many of the other metals, gold is sometimes deposited in veins in the rocks by the action of underground waters. When streams erode the rocks containing these veins, they carry the eroded sand, gravel, and gold downstream and deposit them all together in beds called *placer deposits*. Thus gold is obtained from both underground and surface deposits.

The United States ranks second in the production of gold, South Africa being first. While California, Colorado, and Alaska have the most productive mines in this country, gold is obtained to the value of a million dollars or more a year in at least six other states. The total production of the United States has exceeded $100,000,000 a year, but is less than that at present.

Russia is the only European country with important gold deposits, and even South America and Mexico, from which the Spaniards obtained so much gold, are no longer large producers. Japan and Siberia yield most of the gold of Asia, but the amount is not large. It is an interesting fact that the small area of

anthracite coal in eastern Pennsylvania yields a greater annual value than all the gold mines of the world.

The two chief sources of platinum are the Ural Mountains in Russia, and Colombia in South America.

Silver. — Three fourths of the silver now being mined comes from North America; Mexico leading, and the United States and Canada ranking second and third. The greater part of the silver of the world is found in association with other metals such as lead, gold, and copper. In Montana the greater part of the silver is obtained from copper ores; while in Idaho the silver is mainly associated with lead. In South America silver is mined in many places in the Andes Mountains, but most largely in Peru. Australia ranks third among the continents in the mining of silver, yet its production is not large, while Europe, Asia, and Africa produce still less. Silver is useful in the manufacture of certain wares, and for small coins, yet it plays no large part in the affairs of the world except in a few countries where a silver standard of coinage still exists.

Lead and Zinc. — Lead and zinc are frequently found together, though not always. Both have a number of uses which they serve better than any other metal. Both are extensively used in making paint; lead pipe is especially valuable in plumbing operations, and lead is also used for shot and in type metal. Tea chests from China and Japan are lined with thin sheet lead to protect the tea from air and moisture. Zinc is used in galvanizing or coating sheet iron and steel wire to prevent rust. An alloy of zinc and copper forms brass. Many of the illustrations in books are printed from zinc plates which are referred to as "zinc etchings."

The United States is the leading producer of both lead and zinc, with Missouri, Idaho, and Utah yielding about three fourths of our total output. The principal zinc regions are in the Joplin district (Missouri, Kansas, Oklahoma, and Arkansas), in the Butte district of Montana, and in southwestern Wisconsin. The value of the lead and zinc produced annually in the United States is greater than that of the gold and silver.

Aluminum. — As an element in the earth's crust, aluminum is much more abundant than iron, for it is a constituent of clays which are present in most soil. But the ore (known as *bauxite*) from which the metal aluminum can be profitably extracted is relatively rare. Arkansas supplies over 80 per cent of the bauxite mined in the United States; but Alabama, Georgia, and Tennessee contain important deposits. The metal is strong, tough, malleable, and very light. It does not corrode easily and, because of its lightness and strength, it serves a number of purposes better than any other metal.

Other Minerals

Clay and Clay Products. — Clay beds are common, but in only a few places in this country is the clay of sufficiently high quality to be used in the manufacture of fine pottery; a considerable part of such clays are imported, especially from Cornwall, England. But for the manufacture of various kinds of brick, tile, and coarse pottery, suitable clay is found in many states, and some is found in every state. In no less than eight of our states, clay products are the most valuable mineral products; all of these states are east of the Mississippi.

Huge quantities of brick and hollow tile are used in buildings, and large quantities of brick are used for paving. These products are so heavy that whenever possible they are made near the regions in which they are to be used. For example, most of the common brick used in the city of New York are made along the banks of the Hudson and Raritan rivers and are shipped cheaply by water to New York. This is one of the leading brick-making regions of the world, as it combines four geographic advantages not found so fully in any other part of the United States:

(1) Abundance of clay of rather uniform quality;

(2) Great consuming markets near by;

(3) Cheap water transportation between the producer and the consumer;

(4) Relatively cheap fuel from eastern coal fields.

Ohio is the leading state in the manufacture of clay products, including almost every kind, from very expensive pottery to common brick and tile. The chief pottery-making centers are Trenton in New Jersey, and East Liverpool in eastern Ohio.

The clay products of the United States are worth about three times as much annually as the gold production of the country.

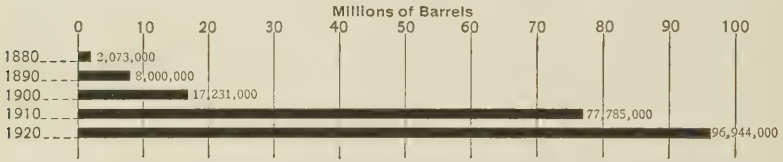

FIG. 112. Cement manufacturing in the United States, in barrels per year.

Portland Cement. — The manufacture and use of Portland cement has had a most remarkable growth (Fig. 112). Before 1890 only a very small amount was made; recent production has been at the rate of over 100,000,000 barrels a year.

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FIG. 113. Building a concrete road. The chief use of cement is in making concrete (artificial stone), a combination of cement, sand, and crushed rock (or gravel) mixed with water. Concrete is extensively used in the construction of roads, bridges, dams, and buildings.

Most Portland cement is made by grinding shale and limestone, subjecting the mixture to great heat, and afterwards regrinding it to a fine flour. Since it is made from heavy materials, the cement mills are located in regions where suitable limestone and shale are found together, and as near to coal as possible, for much coal is used in making the cement. The Lehigh district in eastern Pennsylvania is the largest producer of cement, making in the recent past about 30 per cent of the total made in the United States. There are at least twenty-five other states that have one or more cement plants, but the bulk of the product is made in the middle belt of states from New York to Kansas, the section of greatest building activity. California also is one of the leading producers of cement.

From 10 to 15 per cent of American Portland cement is made from mixtures containing slag, which is a waste product of blast furnaces.

Salt. — Beds of salt are found in the rocks of the earth in many places — both near the surface and at depths of 2000 feet or more. These salt beds are believed to have been formed long ago by the drying up of salt lakes or of isolated arms of the sea. For instance, Great Salt Lake in Utah is slowly shrinking in size and may in time — thousands of years — entirely evaporate. If it does, a thick bed of salt will occupy the present lake basin, and this eventually might be covered by drifting sand and dust blown in from the surrounding desert. In parts of Louisiana, New York, Michigan, and Kansas, rock salt is mined much as coal is mined, but the greater part of our salt is obtained by the evaporation of both natural and artificial brine. In Michigan, New York, and Ohio, the leading states in the production of salt from brine, wells are drilled down to the salt beds and water is run into the wells; the salt is dissolved and the salt brine is pumped up to the surface and evaporated in shallow pans to which artificial heat is applied.

In some cases sea water or the water of salt lakes is led into shallow ponds and evaporated by the sun and air, a practice which is in use on the coast of California, at Great Salt Lake in

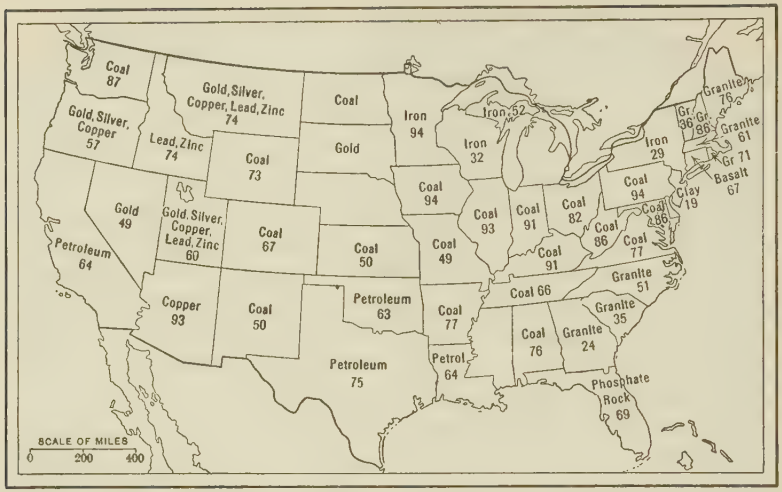

FIG. 114. Important mineral industry or industries of each state; also the percentage of mineral-industry workmen of the state who are engaged in the industries named. For example, of all those engaged in mining in Minnesota, 94% are in the iron industry. States left blank are very small mineral producers.

Utah, and in various foreign countries which have a dry climate or a long dry season. Our great meat-packing, butter, cheese, and chemical industries require about 4,000,000 tons of salt a year. Salt is essential to human life and to many industries, but most countries have an abundant and cheap supply.

Sulphur. — Formerly the island of Sicily, belonging to Italy, was the world's chief source of sulphur. During the last two decades, however, the United States has become the dominant producer of this product, important because it is the basis of sulphuric acid, the most essential of all chemical products, used by the industries of the United States in immense quantities (5,000,000 tons a year).

The great sulphur deposits of the United States are near the Gulf coast of Louisiana and Texas, where vast beds of sulphur lie at depths of several hundred feet above the salt domes of the region. The sulphur is obtained by melting it with superheated water, after which the liquid sulphur of great purity is

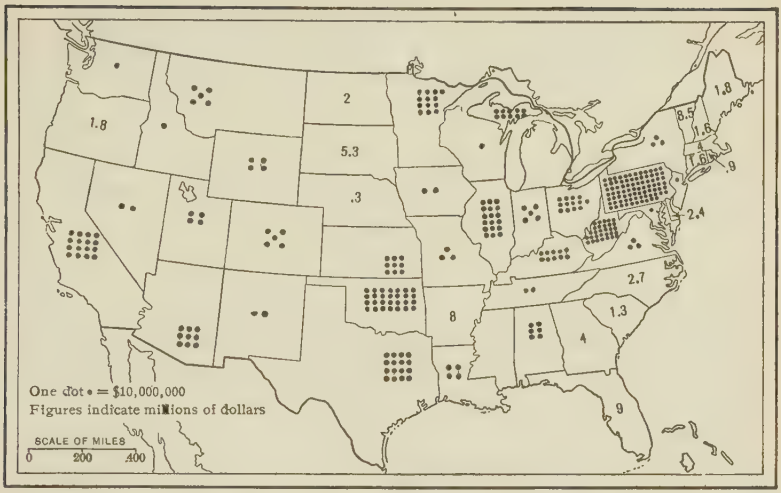

FIG. 115. Annual value of the mineral products of each state; for example, Oregon, $1,800,000; California, $160,000,000.

"pumped" or forced to the surface in large pipes. From two or three sources in this region, four fifths of the world's supply of sulphur is now obtained.

Stone. — Granite, marble, limestone, sandstone, slate, and a few other stones are widely used. The first four are used for building stones; granite and, to a lesser degree, marble, are favorite monumental stones. The largest single use for slate has been in the making of roofing slate, or slate shingles. In some lines of construction, stone has been replaced by concrete, but in others its use has increased. The greatest increase has been in the use of crushed rock for road building and for concrete construction. The increase in our steel industry has called for more limestone, used as a flux in the blast furnaces; and the rapid increase in the use of cement has also called for more limestone. But all of these increasing uses call for the ordinary grades of stone which are found in almost every part of the country.

New England has long been the principal source of granite and

marble for building and monumental purposes, though both are also quarried elsewhere. The annual value of the stone quarried in the United States exceeds the value of all the gold that is mined there.

NOTE. — Several minerals whose production in the United States is unimportant will be discussed in connection with the countries where their production is most important.

EXERCISE

1. Explain the meaning of each of the following terms: peat, lignite, bituminous coal, anthracite, coal measures, soft coal, hard coal, coal seam, coal mine, coal field, coke, charcoal, high-grade coal, low-grade coal, fuel.

2. What is meant by the "energy" in coal? By what means or process is this energy obtained from the coal and brought into use?

3. What other fuels also contain energy which may be utilized in much the same way that the energy of coal is utilized?

4. Illustrate the large amount of energy contained in (*a*) an ounce of coal, (*b*) a pound of coal.

5. How is coal able to make a locomotive go?

6. Why is anthracite preferred to bituminuous coal for use in the home?

7. How is coke made? For what is it mainly used? Where is the best coal for making coke found?

8. Describe the location of the chief coal fields of the United States.

9. Why is the coal of the eastern states more actively mined than that west of the Mississippi? Give two reasons.

10. How does the amount of work done by steam machinery in the United States compare with the manual work done by all the working people?

11. About what fraction of the known coal deposits of the world are in the United States? Explain quite fully the significance of this fact.

12. What two countries of Europe are the leading coal producers? What one in Asia?

13. What is the situation with respect to coal resources in (*a*) Canada, (*b*) China, (*c*) Australia, (*d*) Africa, (*e*) South America?

14. Under what conditions is petroleum found in the earth?

15. What causes a "gusher"?

16. Give the location of the principal oil fields of the United States.

17. What fraction of the oil of the United States is believed to have been already extracted?

18. What are the principal commodities made from petroleum?

19. Why has the gasoline engine become of great importance? For what uses is the gasoline engine preferred to the steam engine?

20. Why are the leading nations very anxious to have, or to have access to, large supplies of petroleum?

21. Give an account of methods of transporting petroleum and its products.

22. Where are the chief petroleum-producing regions of the world?

23. Why is gas an excellent fuel?

24. Discuss the importance of iron and steel in modern life.

25. Give two reasons that support the theory that the rocks of the interior of the earth may contain a great quantity of iron.

26. Where are the chief iron-mining regions of the United States?

27. Why are the Lake Superior mines the most important?

28. Explain the close relation between our steel industry and navigation on the Great Lakes.

29. Why are our chief steel-making centers near the Great Lakes? Name several of these centers. What important steel-making center is in the South, far from the Great Lakes?

30. If you were planning to erect a great plant for manufacturing steel products, where do you think you would locate it? Explain why.

31. What foreign countries yield a great deal of iron ore?

CHAPTER X

WATER POWER, WATERWAYS, AND IRRIGATION

Water as a Resource. — In the greater part of the United States water is so common and so abundant that people seldom think of it as having any particular value. Yet the waters of the United States — both surface and underground waters — have an incalculable value. Without soil water or irrigation water, agriculture cannot exist, and human life becomes impossible. Rivers, canals, and large lakes are, in many cases, important in transportation, as the Mississippi River and the Erie Canal once were, and as the Great Lakes now are. Moreover, water power is again coming into large use and is sure to be of increasing service for generating electricity.

Water Power

Water power is developed by directing a stream of water upon the blades of a specially designed wheel which is thus forced to revolve. For example, in the old-fashioned overshot wheel (Fig. 116) a stream of water was directed against the paddles, and the wheel was thus kept in motion, giving rise to a certain amount of power.

Past and Present Importance of Water Power. — Down to about 1870, water power was used more than steam in the United States, and most of the sawmills, flour mills, feed mills, cotton mills, and woolen mills of New England and other sections generally used water power. At that time the mill that used water power had to be located on or near the bank of the stream and on the spot where the power could be obtained. If the water power was a large and important one, a town usually grew up there and perhaps became a city. A large proportion of the villages and cities that grew up in the United States prior to the Civil War

were at places on streams where water power could be obtained. So important was this power to the industries of those early days that very few towns could grow very much without it. But there were two disadvantages of these early water powers that led to the abandonment of most of them in favor of steam power: (1) The water power site was in many cases in out-of-the-way localities, and (2) the amount of water in the stream varied greatly from time to time according to the rainfall, and in the

FIG. 116. An old overshot water wheel in Arkansas, of the type in common use a half century or more ago.

dry months nearly failed; and the mill that depended upon it was idle or nearly idle for weeks at a time.

The steady improvement of the steam engine during the century from 1800 to 1900 led to an ever-increasing use of steam power, for it can be installed wherever it is wanted, is uniform and dependable, and can be increased almost indefinitely. In 1870 about 50 per cent of the mechanical power used in manufacturing in the United States was water power; but by 1900 this had dropped to 16 per cent, while steam power had risen

to 82 per cent. Since 1900, however, water power has again come into increasing use due to the demand for electric power, which is readily developed from water power. This hydro-electric power (*hydro* signifying water) can be transmitted by wires for long distances. Thus at points like Niagara Falls, or Keokuk on the Mississippi River, or Muscle Shoals on the Tennessee River, large hydro-electric plants are built, and the power is used locally or is sent to surrounding places for use in lighting, street-car propulsion, and manufacturing.

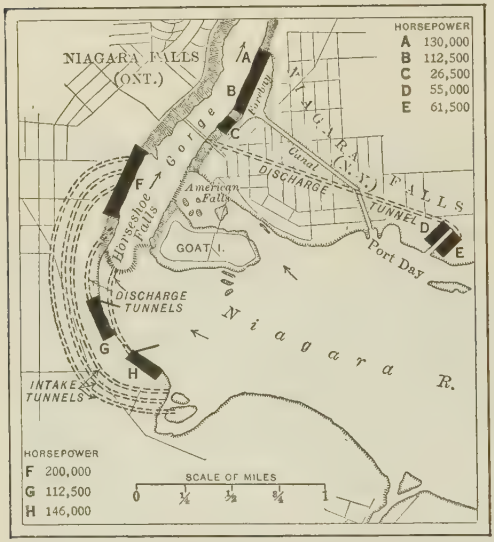

FIG. 117. Power plants at Niagara Falls: A, B, C, D, E, in New York; F, G, H, in Canada.

Modern Water-Power Plants. — There are two general types of water-power plants: (1) those that generate power to be used directly in local manufacturing operations; (2) plants that generate hydro-electric power to sell. The first type of plant is represented by several of the great flour mills of Minneapolis, by many cotton mills in New England and the South, and by paper mills in the states on the Canadian border. These mills, like the mills of the early days, are located at the places where the power is developed. The second type of plant transforms water power into electricity and sells it to consumers. The great power plants at Niagara Falls and at Keokuk, already referred to, are of this type, and plants of this kind are the ones that are increasing most rapidly.

A modern hydro-electric plant usually consists of (1) a dam by means of which a large reservoir for storing water is produced; (2) canals or conduits and huge pipes by which the water is directed upon (3) great turbines, to

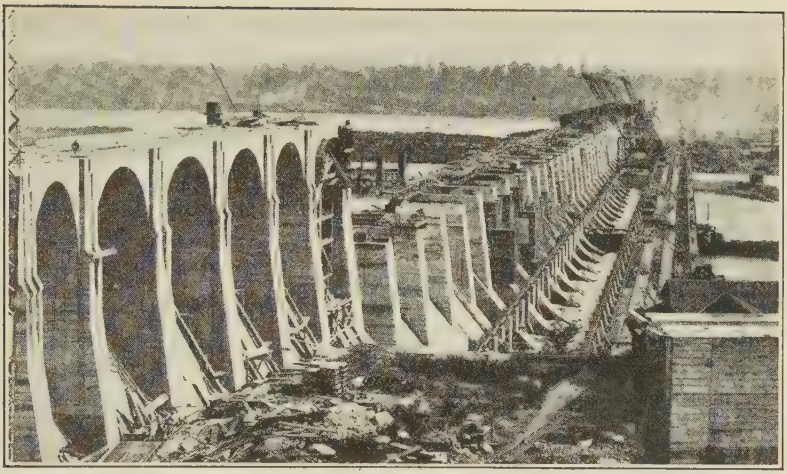

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FIG. 118. Portion of the great dam built by the United States government across the Tennessee River at Muscle Shoals in northern Alabama. It is expected that the completed project will develop upwards of 100,000 horse power.

which are attached (4) powerful dynamos or generators by whose revolution an electric current is generated. The dam and reservoir are necessary to store water to be used at times when the stream is low. Some of these modern hydro-electric plants are capable of developing hundreds of thousands of horse power for twenty-four hours a day. Since five or six tons of coal a year are required to develop each horse power by means of a steam engine, it is evident that water power represents a value, measured in coal, of $25 to $40 a year for each horse power that is developed. In regions where coal is more than ordinarily expensive, the value of water power is still higher.

The Increasing Use of Water Power. — Since about 1900 there has been an enormous increase in the use of mechanical power for manufacturing, for transportation, for mining and quarrying, and — through electricity — for lighting. Coal has supplied the major part of this power, but the percentage of water power used has increased, though not very greatly. The United States uses far more water power than any other country; in fact, uses over 40 per cent of all that is installed throughout

the world. Steam supplies about 80 per cent of all the mechanical power used in manufacturing in this country, and water power about 17 per cent. At the low coal prices of 1900 to 1914, hydro-electric power could not be sold at a price very much below the cost of steam power, but with coal prices now doubled, hydro-electric power is likely to make more rapid gains.

Leading Water Power Region of the United States. — The United States has enormous water power resources, of which perhaps 20 or 25 per cent is developed. The Pacific States — Washington, Oregon, and California — have the greatest amount of *undeveloped* power possessed by any section of the country (Fig. 119), due both to the heavy rainfall in parts of these states

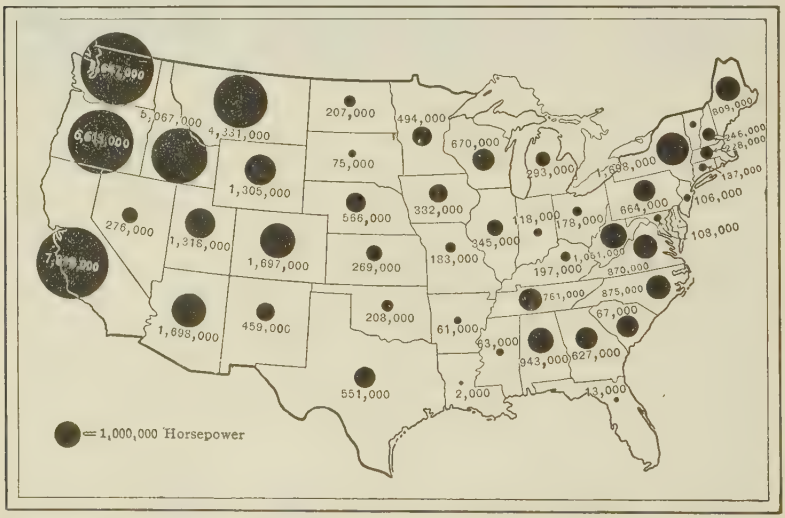


FIG. 119. Potential (not actual) water power resources, indicated by the number in each state. Areas of the circles are in proportion.

and to the high mountains, which give the streams a very great amount of "fall." Two groups of eastern states, (1) New England and New York, and (2) the Carolinas and Georgia, have the largest amount of *developed* water power; this is due to the extensive use of such power in the mills and factories of these

regions. A great many of the cotton mills of New England and of the South use water power so far as it is available.

The largest single water power in the country is at Niagara Falls, where on the two sides of the river more than a million horse power is already in use. Michigan, Wisconsin, and Minnesota — states which mine little or no coal — also have developed a large amount of water power. The great flour-milling industry of Minneapolis and the pulp and paper industry of Maine, New York and Wisconsin are largely dependent on this power. Many important manufacturing cities have grown up at water-power sites: Minneapolis in Minnesota, Rochester in New York, Paterson in New Jersey, Grand Rapids in Michigan, and Fall River, Holyoke, Lawrence, Lowell, and many other cities in Massachusetts. All of the "Fall Line" cities (page 43) — Trenton, Philadelphia, Baltimore, Washington, Richmond, Columbia, Augusta, Macon, and others — have rapids at or near their sites, and these water powers were of considerable importance in the early manufacturing industries of those cities.

Inland Waterways

Importance of Waterways in New Countries. — When the white man came to America, he found an almost trackless wilderness. Most of the country in the eastern third of North America was covered with forests having a dense undergrowth, and to make one's way through them was a difficult and often painful undertaking. Almost the only way to penetrate the country and to get products out was by way of the rivers, and the early settlements on the eastern seaboard pushed slowly up the various streams. Few settlers cared to make their homes far from navigable water, and so it came about that even down to the time of the American Revolution, the rivers largely determined the lines of settlement and development. They have done the same in other new countries, and to-day the rivers of northern Canada, Brazil, Siberia, and Africa are, throughout vast areas, almost the sole routes for the movement of products and people.

River Traffic in the Early Decades of the United States. — By the year 1800, settlers had pushed their way up the east-flowing rivers to the Appalachians, and were streaming through their passes and gaps into the interior of the country. For the most part, these pioneers followed the rivers and their valleys; and when they built homes and cleared farms, they stayed close to the rivers. In the quarter century between 1800 and 1825, thousands of rafts, arks, flatboats, Durham boats, bateaux, and other craft descended such rivers as the Connecticut, Hudson, Delaware, Susquehanna, Potomac, James, and the rivers farther south. The greater part of this movement occurred in the spring and early summer when the rivers were at flood. In the late summer and autumn the streams were low and navigation was difficult or perhaps impossible. The importance of even such a river as the Susquehanna, in Pennsylvania, may be judged from a record kept by a citizen of Harrisburg in 1827. This record shows that during the spring and early summer of that year, 1631 lumber rafts and 1370 arks passed down the river. The arks carried coal, flour, and whisky, the most salable products of eastern Pennsylvania. In addition, it was estimated that about 300 keel-bottomed boats, laden with wheat, also descended the river. In those days lumber and labor were both cheap, and crude boats — especially the flatboats — were built at small cost; the current carried them downstream, and this method of transportation was by far the easiest and cheapest that then existed. Over 150 of the rivers flowing into the Atlantic between Maine and Florida were used for this type of navigation. The rivers along the Atlantic slope and in the Mississippi basin were of incalculable value in the settlement and development of the eastern half of the United States.

The Period of Canals. — As river navigation increased, it became more and more desirable to connect the natural waterways by means of artificial channels; this led to an epoch of canal building, especially between 1820 and 1840. Most of the canals were built to connect important natural waterways such as the Great Lakes, the Ohio River, and the Atlantic. In all, about 4500 miles of canals were constructed (Fig. 120).

Erie Canal. By all odds the most important of these canals was the Erie Canal, which was completed in 1825. It connected Lake Erie with the navigable Hudson River, which flows to New York Bay. The original canal cost New York state a little over $7,000,000; later improvements and enlargements down to 1900 brought the total cost to over $70,000,000, but the tolls collected prior to 1882, when they ceased, amounted to over $120,000,000. For more than fifty years the Erie Canal carried an enormous

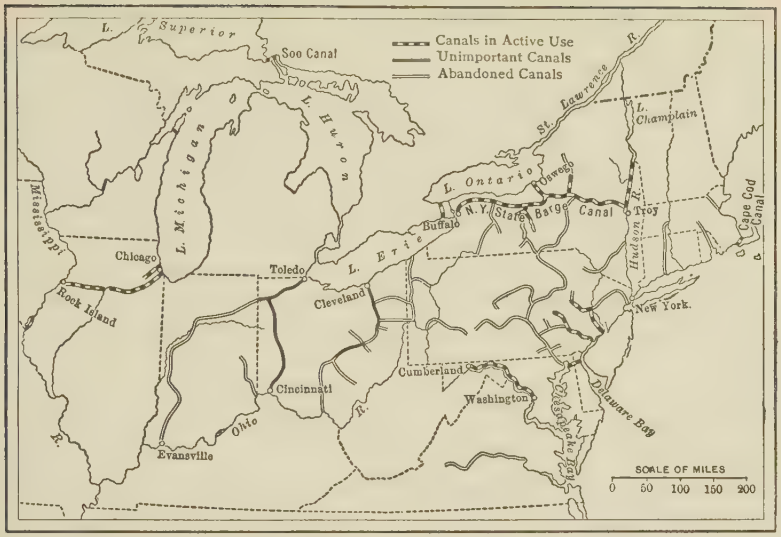


FIG. 120. Canal systems of the United States.

traffic. It was the largest single influence in making New York the Empire State and in making the city of New York the American metropolis. The benefits of this waterway, connecting the Atlantic with the Great Lakes, were shared by the entire northern half of the Mississippi basin as well as by New York state. At times the volume of traffic on the canal was so great that if one of the canal locks got out of order and delayed traffic for a day, the canal became clogged with boats for miles back. The Erie Canal reached the height of its traffic about 1880, and steadily declined thereafter. Here, as in the case of most of our inland waterways, the railroads took an ever-increasing proportion of the traffic. Later, the state of New York sought to restore the usefulness of the Erie Canal by an expensive enlargement and improvement. This new Barge Canal is twelve feet deep and, with branches and terminals, has cost the state nearly $200,000,000. It was hoped that by making this a free water route, maintained at state expense, a large amount of traffic would be drawn to it. It was opened throughout its entire length in 1918, but the growth of traffic has not met expectations.

Other canals. Besides the Erie Canal, New York built several others, as did Pennsylvania and New Jersey also, and these three states had a net-

work of connecting canals and navigable rivers (Fig. 120). Pennsylvania, Maryland, and Virginia each attempted to connect its eastern seaboard with the Ohio River by a canal, but the high barrier formed by the Allegheny Plateau prevented the completion of the undertakings. Ohio constructed a number of canals, two of which connected Lake Erie with the Ohio River. Indiana also built a canal to connect the Ohio with Lake Erie. All the Ohio and the Indiana canals are nearly or entirely abandoned. Illinois built a canal connecting Lake Michigan with the Illinois River and thence with the Mississippi. The more recently built Chicago Drainage Canal parallels this for thirty miles, while another, the Hennepin Canal, connects the Mississippi with the Illinois across the northern part of the state. These Illinois canals, while still in operation, have relatively little use.

In Wisconsin, a waterway was planned from the Mississippi to Lake Michigan by way of the Wisconsin and Fox rivers. The Fox was canalized and is still maintained, but has little traffic.

The Mississippi and its Branches. — For several reasons the Ohio River has been one of the most useful of all our rivers: (1) its valley extends east and west, the direction of our largest movement of freight; (2) its headwaters are in the leading coal field of the United States, and great quantities of coal have been moved down this river; (3) it flows through a very productive agricultural region. During the westward movement of population from the eastern states into the Mississippi basin, the Ohio was a great national thoroughfare. For decades the river was used by flatboats, keelboats, and other craft which carried products downstream to Cincinnati, Louisville, St. Louis, Memphis, New Orleans, and intermediate places. The first steamboat on the Ohio came in 1811, and gradually these boats, which could ascend as well as descend the rivers, built up a large traffic. By 1850 the steamboat traffic on the Ohio and lower Mississippi employed over 1200 steamboats. They formed a veritable procession on the rivers, and the wharves of the principal river towns were scenes of bustling activity as the many boats loaded and unloaded their freight and passengers. This steamboat service on the rivers contributed enormously to the rapid progress of the Mississippi Valley, and was a chief factor in the growth

of such important cities as Cincinnati, St. Louis, and New Orleans.

The upper Mississippi, between St. Paul and St. Louis, is shallower than the section south of St. Louis, yet it was for over fifty years a great highway of traffic, especially for grain and lumber. The Missouri — shallow and silt-laden as it is — was used at periods of high water, but it is a poor river for navigation and has nearly ceased to be used.

Other branches, including the Illinois, Tennessee, Cumberland, Arkansas, and Red rivers, all had their day of usefulness and are still navigated, though to only a small extent. The railroads with their rapid, year-round service, their ability to reach almost any locality, and even to reach the very doors of manufacturing plants and the mouths of mines, have largely supplanted river and canal traffic.

Why River Traffic Declined. — There are many reasons why transportation by river and canal fails to meet the demands of modern business: (1) In the northern states, the waterways are closed by ice several months in the year. (2) Rivers fluctuate greatly in depth, and at very low water navigation may cease entirely. (3) With such wide fluctuations in height of water it is difficult to provide suitable places for loading and unloading boats, with the result that very poor facilities usually exist. (4) Only a small proportion of places are connected by navigable waters. (5) Most of the freight to be carried on rivers must be hauled to the waterways and then transshipped, which may cost as much as sending the freight the whole distance by rail. (6) The railroads have made persistent efforts to discourage water traffic; they have powerful organizations for building up their own business, and they are able to give really superior year-round service. The real cause of the decline of waterways is their inability to meet the competition of the railroads, in part fair competition, but at times unfair.

Recent Efforts to Restore Traffic to the Ohio and Mississippi. — In 1910 Congress authorized for the Ohio River an important system of improvements to consist of fifty-four movable dams, at each of which is to be a

lock. The dams are so constructed that when the river is high they can be caused to lie flat on the bottom of the channel, and boats pass up or down the river freely. When the water is low the dams can be lifted into place and the river is thus transformed into a series of lakes or "pools" with water at least nine feet deep. Boats then pass the dams by means of the locks. By this plan the Ohio is to have a navigable depth of nine feet or more at all times. When this improvement was begun, the Ohio was carrying a large amount of coal in barges downstream to the Mississippi from Pittsburgh, but that traffic had largely ceased before the dams were completed.

Following the World War, the government of the United States sought to restore traffic to the lower Mississippi River. A fleet of modern steel barges was brought into service and these are towed up and down the river by steamers or tugboats. They move rather slowly, but they carry freight somewhat more cheaply than the railroads and are meeting with more success than any other recent effort to restore the Mississippi traffic. A similar service was installed on the Warrior River in Alabama — mainly for carrying coal (Fig. 121). This experiment with the

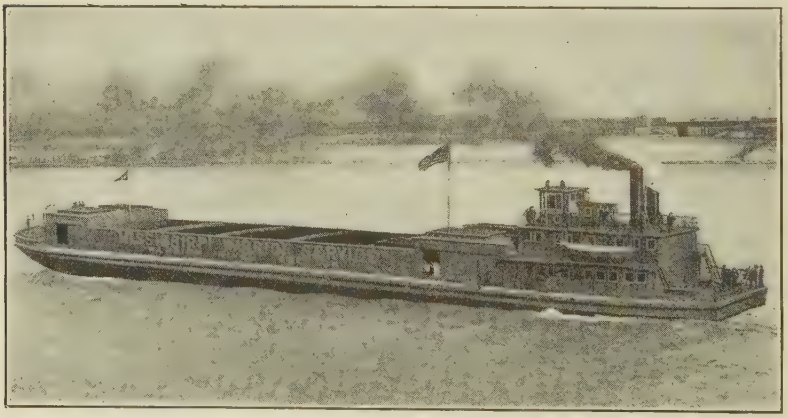


FIG. 121. One type of steam barge used on the Warrior River of Alabama and on the Lower Mississippi.

Mississippi-Warrior Service under government support is being watched with interest, for its success or failure will go far in determining whether or not river traffic can profitably be restored.

The Great Lakes and St. Lawrence Waterway

Characteristics. — The waterway reaching from Duluth and Superior at the head of Lake Superior, or from Chicago near the head of Lake Michigan, to the Atlantic Ocean at the mouth of the St. Lawrence, is over 2000 miles long. The five Great Lakes — Ontario, Erie, Huron, Michigan, and Superior — form the largest group of fresh-water lakes in existence, and they carry a larger traffic than any other inland waterway in the world.

The St. Lawrence River has a number of rapids which interfere with navigation, but each of these is passed by an artificial canal about fourteen feet in depth. Lake Erie is connected with Lake Ontario by the Niagara River, which is not navigable because of Niagara Falls and long rapids; but navigation between these two lakes is provided for by the Welland Canal (Fig. 173), now being improved so as to accommodate boats drawing about twenty-five feet of water. Between Lake Erie and Lake Huron are the Detroit River, Lake St. Clair, and the St. Clair River; these two short rivers have been dredged to a depth of about twenty-one feet. Lake Huron connects with Lake Superior by the St. Marys River, including the St. Marys Falls or rapids (the Soo), which are not navigable; but navigation is provided for by two canals on the American side and one on the Canadian side. Thus, boats drawing about twenty-one feet of water can pass from Lake Superior or Lake Michigan to points on Lake Erie, and upon completion of the new Welland Canal can reach points on Lake Ontario. At present, boats drawing not over fourteen feet can pass from any of the Great Lakes to Montreal and out to the Atlantic. A movement is on foot to secure the deepening of the St. Lawrence to twenty-five feet, thus opening a deeper waterway from the lakes to the sea.

Earlier Use of the Great Lakes for Navigation. — The Great Lakes were used by Indians, explorers, fur traders, and others down to and somewhat after the War of 1812. Since that period there has been a more or less steady increase in the use of the lakes. Steamboat navigation on the Great Lakes dates from about 1816. During the twenty years preceding the

Civil War, the lakes were the scene of a very busy passenger and freight business between Buffalo and points in the West. In 1840 there were eight regular lines of steamers between Buffalo and Chicago. In 1850 there were thirty-six steamboats and steam propellers running regularly between these two cities and stopping at the larger cities between; and in all, 140 steamboats were operating on the lakes. Hundreds of thousands of homeseekers came into the Middle West by these boats, and a large part of the surplus products of the region was sent to eastern markets by way of the lakes and the Erie Canal. These were busy days at the lake ports. Boats of some sort were arriving and departing almost every hour of the day. A stream of immigrants was pouring into the West, and an ever-increasing volume of agricultural and forest products was moving from port to port. By 1860 the fleet of steamers and propellers had grown to over 300, and sailing vessels to over 1100. In 1870 the sailing vessels had increased to 1800; but after this date their number fell off, and they have almost disappeared from the lakes. Wooden steamships gave place to iron, and then to steel ships of larger and larger size; and as the boats increased in size their number tended to diminish, while railroads took more and more of the passenger and general freight traffic.

Great Lakes Traffic since 1900. — During the years following 1900 a marked change took place in the traffic on the Great Lakes. In the earlier part of this period, passenger traffic between eastern lake ports and western lake ports was large; several railroad companies had fleets of steamers carrying general freight; but in 1914 a law went into effect which forbade the railroads to own and operate steamships. During the World War the demand for ships on the ocean drew from the lakes a number of vessels, and when the war ended, the general freight and passenger traffic on the lakes had declined very greatly.

However, during the years following 1900 there came a notable growth in the carrying of iron ore and coal on the lakes. The whaleback boats, which had not proved satisfactory, were replaced by a new special type of bulk-freight carrier which has proved highly efficient (Fig. 122).

The iron ore, coal, and grain traffic. It has already been pointed out that the chief iron-ore deposits of the United States are near

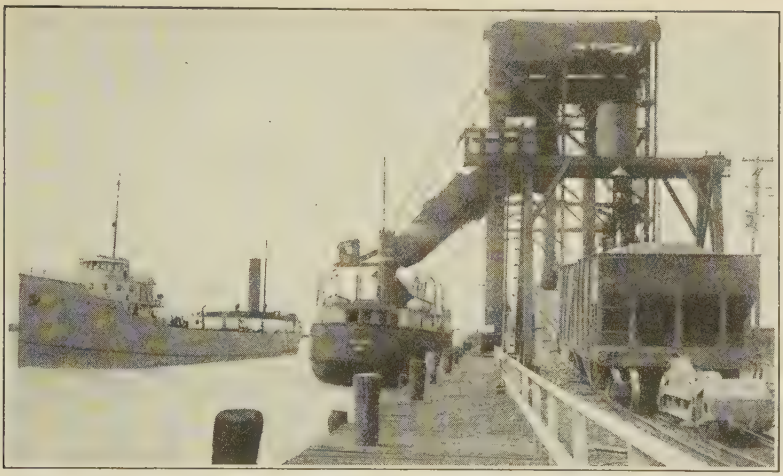


FIG. 122. Dumping carloads of coal into a lake steamer. At the left is one of the special type of bulk-freight carriers.

Lake Superior (Fig. 106), while the chief smelting and steel-working centers are in the region between Lake Erie and the Pittsburgh district, and at the southern end of Lake Michigan (pages 180–182). Transporting the tens of millions of tons of ore eastward calls for a large fleet of ore-carrying boats. Some of these boats also carry coal westward. The total traffic in coal and iron ore through the St. Marys Canals has exceeded 80,000,000 tons in a single year, and the traffic of all kinds through the Detroit River has reached 100,000,000 tons a year. This is many times the tonnage of freight that goes through the Suez Canal or the Panama Canal.

Boats of the same type also carry grain, which is rapidly and cheaply loaded and unloaded by means of elevators. These three commodities — iron ore and grain moving eastward, and coal moving westward — make up about 90 per cent of the total traffic on the Great Lakes. In transporting these bulk commodities, which are carried long distances in full cargoes, and are loaded and unloaded by especially efficient machinery, the lake steamer can easily underbid the railroad.

Irrigation and Drainage

The Arid West. — Almost the whole of the United States lies in the wind belt of the Prevailing Westerlies. Not far from the Pacific Coast and running nearly parallel to it are ranges of mountains — the Coast Ranges, the Cascade Mountains and the

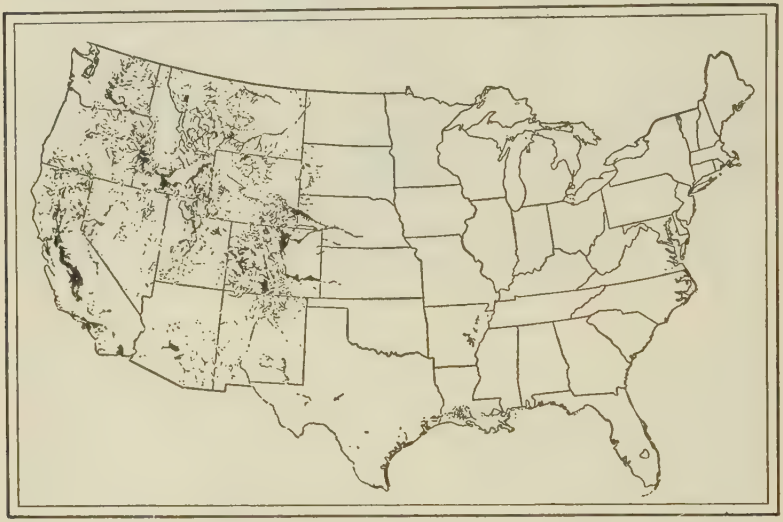


Fig. 123. Irrigated land in the United States. (*U. S. Dept. Agr.*)

Sierra Nevada, and farther east the Rocky Mountains; two or more of these ranges must be crossed by the winds blowing from the west before they reach the interior of the country. As the winds rise over the mountains they are cooled, and most of their moisture falls as rain or snow on the western slopes. As they descend the eastern slopes they become warmer and drier. Thus it comes about that nearly one third of our national area is too dry for ordinary agriculture (Fig. 13). Most of this dry region cannot be profitably irrigated, because of its mountainous character and because of the presence in the soil of injurious alkali salts, and partly also because sufficient water for irrigation is not obtainable. Of the several hundred million acres in the arid

West, perhaps 4 or 5 per cent can be profitably irrigated. The eastern half of the United States derives a large part of its atmospheric moisture from the Gulf of Mexico and the Atlantic Ocean.

Location and Extent of Our Irrigated Lands. — The meridian of 100° west longitude passes through the Dakotas, Nebraska, Kansas, Oklahoma, and Texas. About half the area of the United States lies west of that meridian, and the greater part of the western half receives less than 20 inches of rainfall a year. Irrigation is employed somewhat in all of the states west of the meridian of 100° (Fig. 123). Upwards of 15,000,000 acres

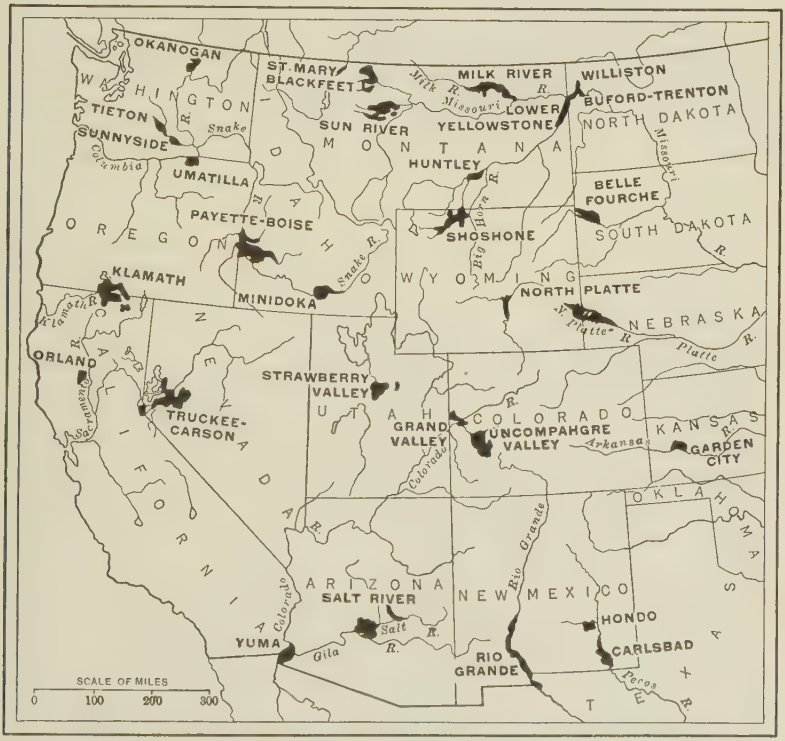
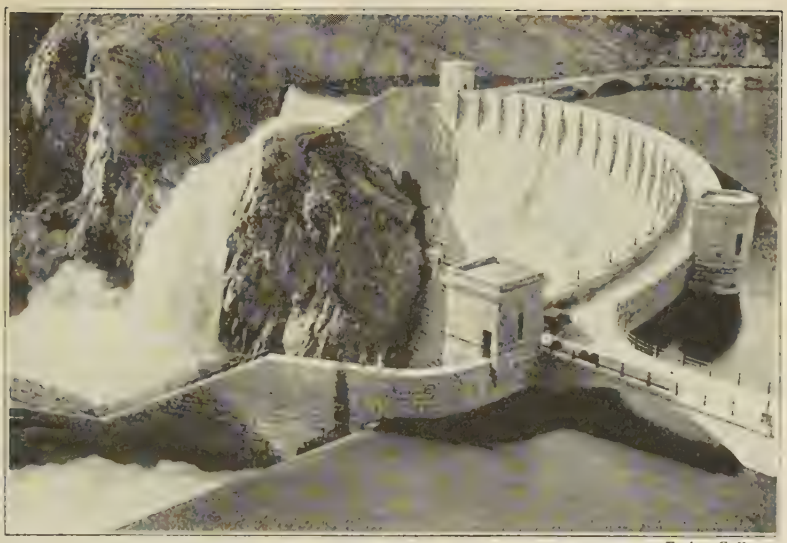


FIG. 124. Sites of irrigation projects of the U. S. Reclamation Service.

of land are under irrigation; this is about half the area of Pennsylvania or New York, and is about 1 per cent of the area of the eleven states in which most of the irrigation is done. California has the largest amount of irrigated land, and leads all the states in the value of the products of its irrigated lands. Colorado, Montana, Utah, Wyoming, and Idaho also have considerable areas under irrigation. The cost of bringing water to the land varies all the way from $10 an acre to over $75 an acre. The latter figure applies mostly to the United States government projects, which are by far the most expensive. The United States Reclamation Service supplies water to about one seventh of all the land that is under irrigation, the balance being supplied mainly through individual and partnership enterprises, cooperative companies, and corporations.

Crops under Irrigation. — Like all other enterprises, irrigation farming has its advantages and its disadvantages. It is more intensive in character than is ordinary American farming, and larger and better crops are produced. The farmer is less subject to the whims of good and bad weather; he has control of the water supply, and nature usually provides abundant sunshine in these dry climates. On the other hand, it costs more, as a rule, to produce crops under irrigation than under natural rainfall; the irrigated lands are in many cases in parts of the country where the population is small and hence surplus crops may have to be shipped long distances to find a market. There is a prevailing impression in the East that fruit is the principal crop of the irrigated lands. Though it is true that a great deal of fruit is grown under irrigation (Fig. 43), less than 10 per cent of the irrigated land is occupied by it. So far as acreage is concerned, alfalfa is the leading crop grown under irrigation; it occupies from 40 to 50 per cent of the land irrigated by the United States government projects. Cereals occupy about 25 per cent, and sugar beets and cotton each 2 or 3 per cent. Cotton is becoming a money maker in the sunny irrigated lands of Arizona and southern California, where the high-priced American-Egyptian cotton is grown.



Ewing Galloway

FIG. 125. The great Roosevelt Dam 1010 feet long and 384 feet high; 70 miles from Phoenix, Ariz. By means of this dam a large lake is formed and the flood waters are stored for irrigation.

FIG. 126. Irrigating sugar beets.

Land Drainage. — Over 50,000,000 acres of agricultural land in the United States has been provided with drainage to get rid of excess ground water, and still greater areas need drainage (Fig. 127). The greater part of the lands needing drainage are along the Atlantic and Gulf coasts, and are partly forested. A second large region needing drainage includes a part of the bottom lands along the Mississippi River, and a third is the glaci-

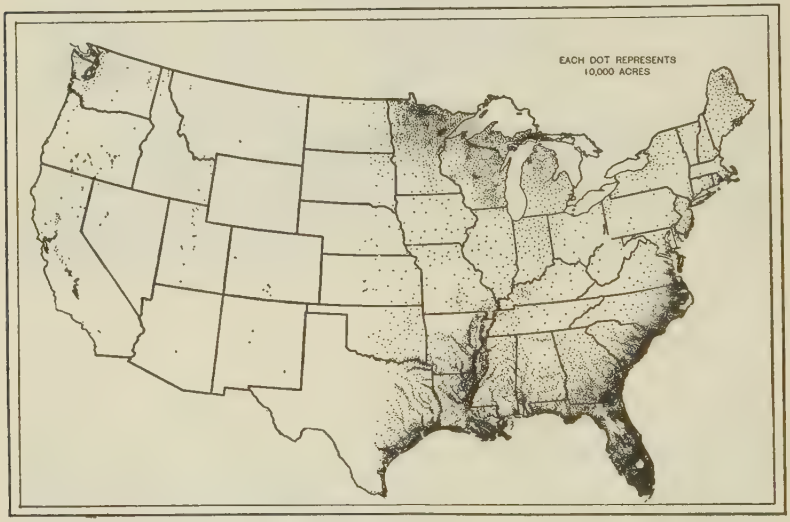


FIG. 127. Wet lands in need of drainage. (*U. S. Dept. Agr.*)

ated lands of the northern parts of Minnesota, Wisconsin, and Michigan. Only a part — and possibly a minor part — of these lands would be good agricultural lands if they were drained. Of the agricultural land that has been reclaimed by drainage, more than half is glaciated land in the three states of Ohio, Indiana, and Illinois; this is now some of the best land of the country. When drained, swampy land may become excellent farm land, but this is not always true; in some instances the drained land proves almost worthless for agriculture on account of acidity of the soil or other unfavorable conditions.

Exercise

1. Why may underground water be regarded as a *resource?*

2. Why is the great industry of agriculture peculiarly dependent upon water?

3. Why is there more water power available in a region like New England than in one like Illinois?

4. Why did the use of water power decline — at least relatively — between 1870 and 1900?

5. Why did most of the early settlements in the eastern states grow up at places where water power was obtainable?

6. Why were many of the small, early water powers afterward abandoned?

7. Why is it not now necessary to erect *at the water power site* the mills that depend upon water power?

8. Why is the extent to which water power is developed considerably dependent upon the price of coal in any given region?

9. Why is undeveloped water power called "potential" water power?

10. Why is the potential water power of Washington, Oregon, and California exceptionally large?

11. Why is water power in New England more fully developed than in the Pacific States?

12. Why is water power more largely used in New York or North Carolina than in Ohio or Pennsylvania? (Consider which states have coal.)

13. Why were navigable rivers of great importance in our pioneer period?

14. Why was the "canal epoch" in the United States short?

15. Why was the Erie Canal the most successful of all American canals?

16. Why were Pennsylvania, Maryland, and Virginia not able to complete their canals from the Atlantic Ocean to the Ohio River?

17. Why does river navigation usually prove unsatisfactory?

18. Why were the Ohio and Mississippi the most useful of our rivers?

19. Why do railroads now carry most of the traffic formerly carried on rivers?

20 Why are the Great Lakes of importance to our iron industries?

21. Why does traffic on the Great Lakes and the St. Lawrence River have to be discontinued for about four and one half months each year?

22. Why is the practice of irrigation in this country mainly confined to the western states?

CHAPTER XI

ROADS AND RAILROADS

Methods and Costs of Transportation. — Anthracite coal from Pennsylvania is used in the homes of the people of Madison, Wisconsin. From the street to the basement window of a certain house there, the distance is sixty feet, or one eighty-eighth of a mile, and the charge for carrying coal in baskets this distance is seventy-five cents a ton, or at the rate of $66 per ton per mile. The coal yard is about one mile away, and the cost for hauling coal this distance by an autotruck or horses is about $1 per ton. The coal comes to Madison from the lake port of Milwaukee by railroad at a cost of $1.75 a ton for a distance of eighty-three miles, or at the rate of about two cents a ton-mile. It is brought from Buffalo on Lake Erie to Milwaukee by lake steamers, a distance of nearly 1000 miles, at the rate of fifty cents a ton, or about one twentieth of a cent a ton-mile. Using this example as a typical illustration, the following table of costs for transporting coal may be made:

(1)	In baskets on the shoulder of a man	$66.00	a ton-mile
(2)	In truckloads by horses or autotrucks	1.00	a ton-mile
(3)	In carloads by railway	.02	a ton-mile
(4)	In shiploads on the Great Lakes	.0005	a ton-mile

Stating the facts in a slightly different way gives the following as a fair average:[1]

For 1 dollar, a man	will carry a ton of coal	100 feet
For 1 dollar, a truck	will haul a ton of coal	1 mile
For 1 dollar, a locomotive	will haul a ton of coal	50 miles
For 1 dollar, lake steamer	will carry a ton of coal	2000 miles

[1] For long hauls by truck or by train the cost per ton-mile is less than here given.

Clearly, the cost of moving commodities depends very much upon the means of transportation which are employed. The cheapest method is by boat, especially if the commodity is carried a long distance in large cargoes, as is the case with coal and iron ore on the Great Lakes (page 206). The next cheapest method is by railway, especially if the commodity is carried in bulk and in carload or trainload lots. It has already been mentioned that on a level, straight track, one ounce of coal burned in a modern locomotive will move a ton a mile. But it required thousands of years for man to reach the stage of scientific achievement that makes possible such efficient methods of transportation.

Early Land Transportation in the United States. — If the land of the United States had been level, smooth, firm, and unforested, overland routes of transportation would have been established rather easily; but instead it was in many places hilly or mountainous, or contained swamps, and most of the land in the eastern part of the country was forested. The Indians had worn their trails along routes which they found easiest or most suitable to their movements, and the early routes of travel adopted by the white man followed the Indian trails. Over these winding paths the explorers and pioneers carried on their backs the supplies, tools, furs, and a few other things which they used in their simple manner of life. In the progress of settlement the main trails grew into paths, along which horses carried men and goods as pack animals still do in much of South America.

Rupp's history of Cumberland County, Pennsylvania, published in 1848, says:

> The modes of transporting or conveying produce and other articles of commerce have been, like the highways, thoroughfares, or public roads, much improved within the memory of many now living west of the Susquehanna. Sixty or seventy years ago 500 pack horses had been at one time in Carlisle, going thence to Shippensburg, Fort Loudon, and further westward, loaded with merchandise, also salt, iron, etc. The pack horses used to carry bars of iron on their backs, crooked over and around their bodies; barrels or kegs were hung on each side of these . . . The pack horses

FIG. 128. Mule train in Colorado. In parts of the mountainous West, goods and in some instances ores are transported by pack animals.

were generally led in divisions of twelve or fifteen horses, carrying about two hundredweight each, all going single file, and being managed by two men.

The Turnpike Era. — The construction of good roads for wheeled vehicles required cutting away the forest trees, digging out the stumps, removing the bowlders or loose rocks, filling in the swampy stretches (usually with logs laid close together, called a corduroy road) and grading the difficult slopes. It was a costly undertaking, and the early turnpikes usually were built and managed by private companies or corporations, as railroads now are. Toll gates were placed along the roads a few miles apart, and each time a traveler passed a toll gate he paid a fee of a few cents. Streams were crossed at shallow places called fords, or by means of crude ferryboats which conveyed horses, wagons, and people across the stream for a charge of ten to

fifteen cents. Bridges came into use slowly; usually they were built of wood, but sometimes of stone, and they were most often built by a company that charged travelers toll for the privilege of crossing. Thus the turnpikes, ferryboats, and bridges — as a rule being privately owned — were supported by payments made by those who used them. It cost a person more in tolls for the privilege of hauling a load of produce twenty or thirty miles to market with his own team and wagon than he would now pay a railroad for doing it.

Keystone

FIG. 129. One of the covered wooden bridges which were common in the days of toll roads and toll bridges.

Turnpike travel was the most picturesque stage of transportation. Regular lines of stagecoaches (Fig. 130) transported passengers from one city to another. Freight was hauled long distances in large covered wagons, each drawn by six or eight horses. Scores of wagons would move along close together, forming a long train. At night both stagecoaches and wagons would stop at one of the many taverns which furnished shelter and food for man and beast.

The National Pike, or Cumberland Road, as it was also called, was begun in 1811 and was the most famous of the early

turnpikes. It extended westward from Cumberland, Maryland, through Wheeling, across Ohio and Indiana, and reached Vandalia, Illinois, in 1838. For that period it was an excellent road, — broad, hard-surfaced, provided with substantial stone bridges, and much used. The first 130 miles cost the national government $1,700,000, a huge sum at that time. This road fell into disrepair after the coming of railroads, but has more recently been remade into one of the great automobile routes of the country.

The Early Railroads. — Experimental railroads were built in England as early as 1800, about a quarter century before they came into use in the United States. The earliest railroads both in England and in America had wooden rails and used horses. Later, strips of iron were nailed lengthwise of the wooden rails. The first steam locomotive was used in England in 1825. The owner of the first American locomotive boasted of its ability to haul thirty tons on a level track; this is about half the weight of an ordinary loaded coal car of the present. A Philadelphia paper carried this notice: "The locomotive engine (built by Mr. W. Baldwin of this city) will depart daily — when the weather is fine — with a train of passengers; on rainy days horses will be attached."

The earliest railroad for public use in the United States was the first fifteen-mile link in the Baltimore and Ohio, built westward from Baltimore and opened for use in 1830. Horses were used. The passenger coaches in size and general construction were practically like the stagecoaches of the period, and the freight cars were slightly modified wagons.

Peter Parley's *First Book of History*, published about 1830, contains this interesting paragraph:

> But the most curious thing in Baltimore is the railroad. I must tell you that there is a great trade between Baltimore and the states west of the Allegheny Mountains. . . . Now in order to carry on all this business more easily the people are building what is called a railroad. This consists of iron bars laid along the ground, and made fast, so that carriages with small wheels may run along upon them with facility. In this way one

FIG. 130. Stagecoach.

FIG. 131. Horse-drawn railroad coach.

horse will be able to draw as much as ten horses on a common road. A part of this railway is already done, and if you choose to take a ride upon it, you can do so. You will mount a car something like a stage, and then you will be drawn along by two horses at the rate of twelve miles an hour. (Fig. 131.)

Since railroads were simply roads with rails, and since horses were employed in the beginning, the people considered the first lines as public roads which any one who had wagons that would run on the rails might use by paying for the privilege. But when locomotives came into service, the railroads ceased to be open to the use of individuals; only the rolling stock belonging to the railroad company was employed, and railroad companies

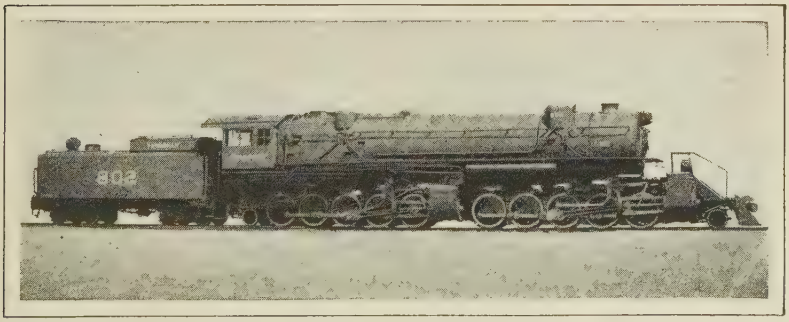


FIG. 132. Modern high-power locomotive with 20 drivewheels.

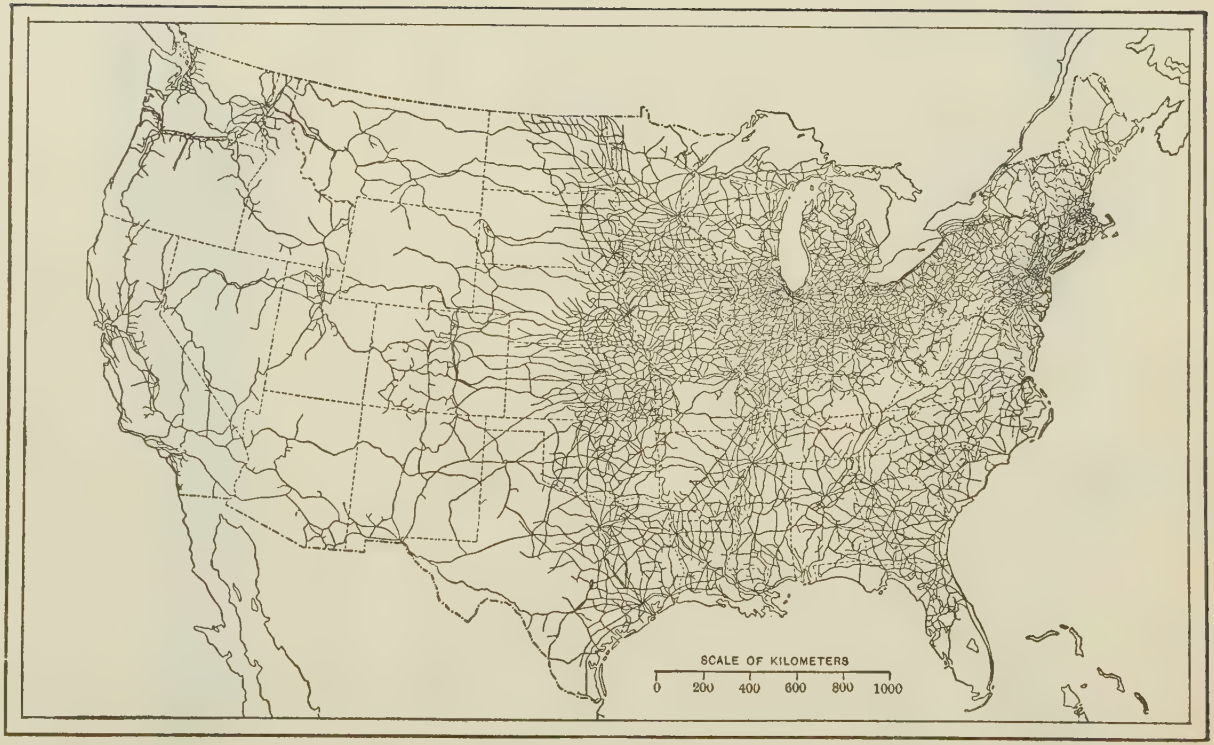


FIG. 133. The railroads of the United States.

became public carriers. Many people were opposed to railroads thus controlled by corporations, because of their monopolistic features. Others believed that they could not possibly succeed in competition with canals or other waterways. Some believed they were suited only to carrying passengers; and it was generally considered that their chief use for freight carrying was in linking up the waterways or acting as feeders to them.

After 1850 the extension of railroads was rapid, especially between 1880 and 1890. The success of early railroads led to an over-extension of lines; in some cases frauds were practiced by promoters and officials, and heavy losses were suffered by people who provided the money for these enterprises. Townships, counties, cities, and the national government raised money for railroads, a part of which was misappropriated or wasted, and many of the railroad companies passed through bankruptcy. The frauds of unscrupulous promoters, the losses sustained by investors, and the unfair rates charged by some companies brought the railroads into disfavor, and part of the public is still semi-hostile toward them. In many cases, early roads in undeveloped regions were aided by grants of public lands made both by the states and by Congress. Millions of acres of land in the West thus passed into the possession of railroad companies, but the benefits which have come to the country from the building of those land-grant railroads seem to have justified the procedure.

Period of Railway Consolidation. — Most of the early railroads were short lines; for example, at one time a traveler between New York and Buffalo had to use about twelve different railroads, getting off one train and on another again and again. When these various short lines were linked up into the New York Central and Hudson River Railroad and came under one management, there was great opposition by people who feared this new "monopoly." This is one of many cases in which the progress of transportation in the United States has met vigorous opposition either from the public or from competing carriers or others whose private interests were concerned.

Since the success of railroads was established, there has gone on a steady acquisition of weak lines by stronger ones, and a consolidation of lines into greater and greater systems. The present Pennsylvania system, for example, is made up of a great number of originally independent lines, many of which could not thrive as separate roads, but succeed as parts of a unified system. This period of consolidation was also a period of intense rivalries among parallel systems, leading to rate wars in which freight or passenger rates were cut so low that financial ruin threatened the roads — even the strongest of them. In one of these rate wars, cattle were carried from Chicago to New York for a dollar a carload.

The Great Railway Systems of the Present. — Out of the struggles and great building operations of the past, certain dominant systems have emerged. The two leading systems between the Atlantic seaboard and the Middle West are (1) the New York Central Lines connecting Boston and New York with Buffalo, Cleveland, Detroit, Chicago, Cincinnati, St. Louis and other chief cities of this region, and (2) the Pennsylvania System connecting New York, Philadelphia, Baltimore and Washington with Pittsburgh and all the cities mentioned above. The Southern Railway, a large, disjointed system, serves the southern states east of the Mississippi, while the Illinois Central and the Louisville and Nashville are the principal north-south roads in the Mississippi Valley. In the Central States are many great systems, including the Rock Island, the Chicago and North Western, the Burlington, and others. Nearly all the main systems reach Chicago, the world's greatest railroad center, but no single line in the United States reaches from coast to coast, as does the Canadian Pacific in Canada.

Of the lines to the Pacific coast, three belong to the Northwest; they are the Northern Pacific, the Great Northern, and the Chicago, Milwaukee, and St. Paul, all of which extend to Puget Sound. The principal direct line to San Francisco is the Union Pacific which, with the Central Pacific, formed the first of the transcontinental lines, completed in 1869. The two southern lines to the Pacific coast are the Atchison, Topeka, and Santa Fe, whose eastern terminal is Chicago, and the Southern Pacific, whose eastern terminal is New Orleans and which has an important southern extension in Mexico. Both systems reach Los Angeles and San Francisco. Thus there are six main systems connecting the Central States with the Pacific coast, two great systems and several lesser ones connecting the East with Chicago

and St. Louis, two important systems and various minor ones extending north and south in the Mississippi Valley, and one extensive system in the Southeast. This is by no means a complete list, and the systems are by no means of equal importance, but they illustrate the persistent tendency to combine separate lines into systems.

The Dependence of Modern Life upon Railroads. — The importance of cheap, rapid, efficient transportation in modern

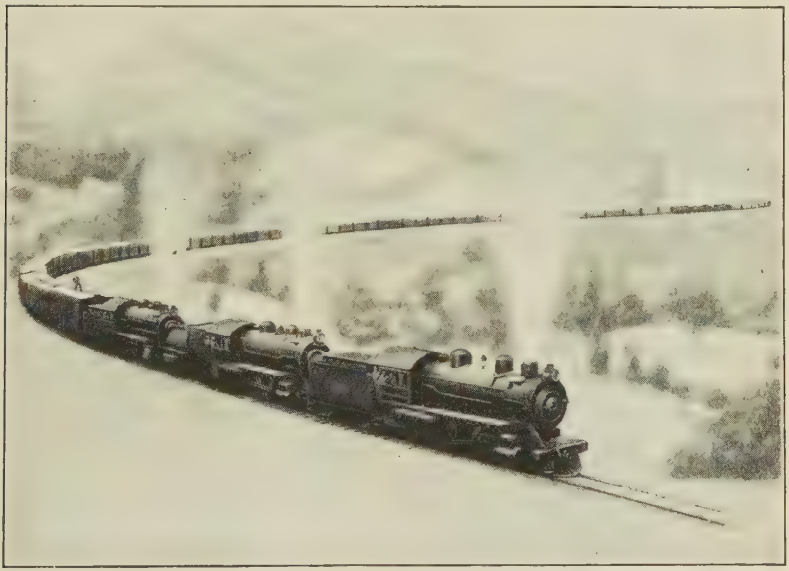


Fig. 134. On the steep grades and many curves necessary on mountain railroads, several locomotives may be needed for a single train.

life is pointed out in various chapters of this book. The possibility of successful farming depends upon the nearness of the railroad to the farm. It may cost the farmer as much to haul his products ten miles to a railroad station, as the railroad charges for conveying the products hundreds of miles to market. Coal or timber or ore has little value until it is reached by cheap transportation. Large manufacturing plants must have railways not only to their factory doors, but actually entering their

buildings. The people of the great cities must have hundreds of carloads of milk, meat, fresh vegetables, and other provisions entering the city in an endless procession or they will soon go hungry.

The United States has about 260,000 miles of railways, with a total of 375,000 miles of tracks. This is more than the total railroad mileage of Europe, and more than a third of the world's mileage. The value of these roads and their property is about $20,000,000,000, and their income over $5,000,000,000 a year. American railway employees and their families form a population as large as that of Norway (2,500,000), and the taxes paid yearly by the railroad companies of the United States exceed the total taxes collected from all sources by all the national governments of South America, omitting Argentina and Brazil.

Notwithstanding the tremendously valuable service performed by the railroads, in fact, the absolute dependence of the very life of the country upon them, a kind of warfare between the public and the railroads has been maintained for years and still continues in certain quarters. However, the control of the railroads by government is now almost complete, and railway officials are pleading for the very lives of their roads. The public is becoming more friendly toward them, and there is evidence of a saner attitude on the part of both the public and the railway companies. A portion of the American people favor government ownership of the railroads, but the United States Commission of Agricultural Inquiry, reporting in 1923, said: "Measured by relative performance and cost of service, private management (of railroads) in this country is more efficient at less cost than foreign government management." The Interstate Commerce Commission of the United States, in 1923, suggested the consolidation of all the railroads of the country into about twenty systems, including in each system both strong and weak roads.

Electric Railways. — Electric cars, often called trolley cars, came into common use about 1890 and rapidly replaced horse cars and cable cars in the streets of the larger cities. Soon these

electric car lines were extended to suburban towns, and eventually some 50,000 miles of electric railways were built, mainly in the thickly populated sections of the country. Some freight and express move on electric railroads, but their chief use is for carrying passengers. Their advantage lies in their lower cost as compared with steam railroads, in ease of starting and stopping, in their cleanliness, and in frequency of service. Until automobiles became common, the electric railways were reasonably prosperous, but the suburban lines especially have suffered from the competition of both the private automobile and the motor bus, and very few new ones are being built. They served a highly useful purpose for thirty years or more and will continue to do so, although possibly with diminished relative importance.

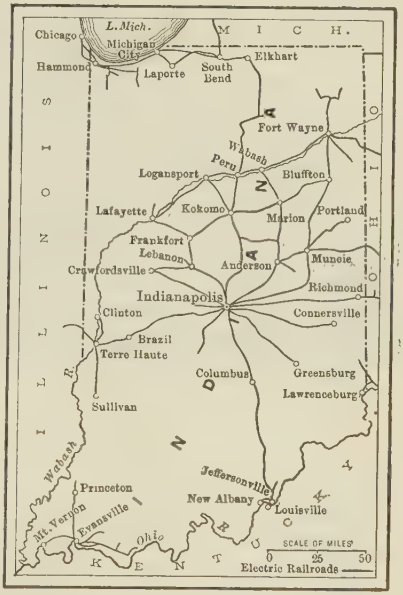


FIG. 135. The interurban electric railways of Indiana.

A number of steam railways have electrified parts of their lines. For example, two links in the mountainous portions of the Chicago, Milwaukee, and St. Paul in the West employ powerful electric locomotives, using current generated by water power. Several railroad lines use electric locomotives in and near the city of New York, as do some other lines in various cities. The rising cost of coal is likely to increase this practice.

Good Roads and Auto Vehicles. — One of the outstanding results of the coming of the automobile is the remarkable rapidity with which good roads have been extended. In the United States there are 2,500,000 miles of public roads — equal to a

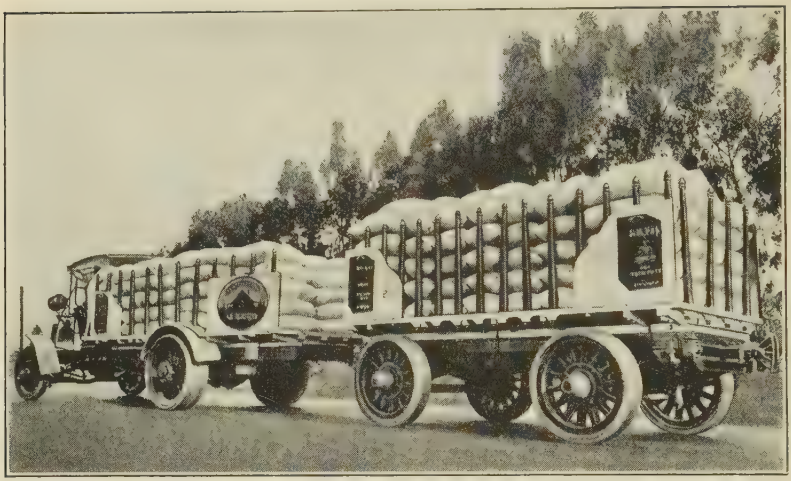


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Fig. 136. Powerful motor truck and trailer. Such a train is capable of transporting 15 to 20 tons.

hundred roads around the world at its largest circumference. The greater number of these roads are ordinary country roads of indifferent or poor quality, but 12 to 15 per cent of the total mileage consists of surfaced roads, a great part of which have an asphalt, cement, brick, or other smooth, durable surface. Hundreds of millions of dollars provided by the states, the national government, the counties, towns, and cities are being expended in the construction of these roads. In fact, this is one of the causes of the rapid rise in taxation. It is beyond question, however, that good roads pay for themselves. On an average, it costs the farmer as much to haul his produce to the nearest railway station as it costs to ship the same produce 200 miles by rail. On a muddy country road it costs about forty or fifty cents to haul a ton a mile with team and wagon; on a dry dirt road it costs about half as much; and with motor truck on a hard-surfaced, well-graded road it costs only about one fourth as much. The building of good roads increases the value of the farm land along the route, reduces the time and cost of

transportation, and makes country and suburban life more attractive.

With the extension of good roads has come a very rapid growth of transportation by motor trucks and motor busses which usually pay only a small license fee for the right to use the expensive public highways, and which derive profit from the carrying of freight and passengers. The heavy vehicles seriously damage the roads and unduly increase the cost of upkeep, but they render a service to the public. They are taking traffic from the electric railways and from the railroads, but it is not yet demonstrated whether or not they will be a permanent and economical means of transportation, except for short distances.

Air Transportation. — During the World War and in the years following, great progress in air navigation was made. The

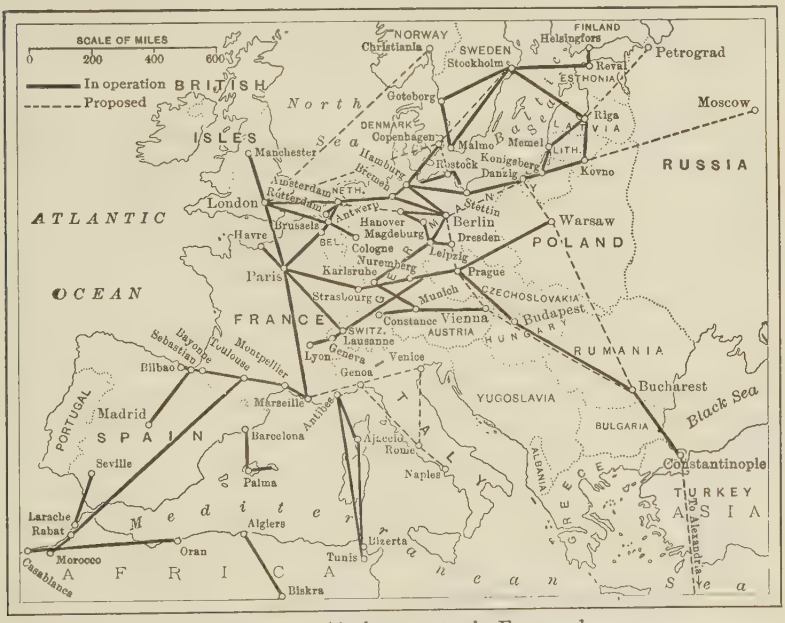

FIG. 137. Airplane routes in Europe. [1]

[1] Prepared under direction of Aeronautical Chamber of Commerce of America, Inc.

leading governments provided money for experimentation, and established mail routes which gave training to aviators. In several countries of Europe and to a small extent in the United States, regular air routes were established, over which airplanes carry mail, passengers, and light freight. Figure 137 indicates the principal air routes of Europe in 1923. The large planes carry from ten to fourteen passengers and 800 pounds of mail or goods, and travel from eighty to ninety miles an hour. Rates for carrying passengers vary greatly, but the established European companies charge from six to ten cents a mile for each passenger. Even then the service does not pay for itself and most of the companies receive government aid. Relatively little freight is carried, for the cost is too high. However, governments feel it necessary to develop and maintain air fleets and to train a considerable body of aviators, and one way to do this is to maintain regular routes for the carrying of passengers and mail.

Summary and Exercise

It is suggested that half of the class prepare a summary and the other half prepare about twenty-five questions covering the chapter. Discuss in class what kinds of questions are good ones, that is, questions that (1) require a study of the textbook or some other source of information, and (2) require the pupil to think for himself.

CHAPTER XII

MANUFACTURES AND THEIR REGIONAL DISTRIBUTION

The United States as an Industrial Nation. — In the value of goods manufactured, the United States ranks first among the nations, yet manufacturing does not play such a dominating part in the economic life of the United States as it does in that of Great Britain. The United States is so large and has such a wealth of natural resources that all its economic activities — mining, lumbering, farming, merchandising, transporting, and manufacturing — are conducted on a large scale. The American

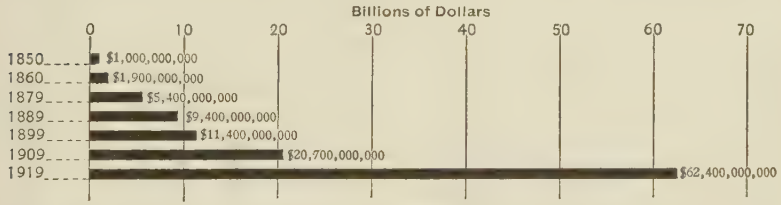

FIG. 138. Growth in annual value of manufactures in the United States. The high prices of goods account for a part of the large total for 1919.

people earn more and spend more than any other people. This is illustrated by the fact that five sixths of the automobiles and three fourths of the telephones of the world are in use in the United States. Because of the great purchasing power of the American people, the consumption of manufactured goods is large, and this has led to factories of huge capacity, to corporations with enormous capital, and to the employment of labor-saving machinery to an extent found in no other country.

Some of the reasons for the high development of manufacturing in the United States are:

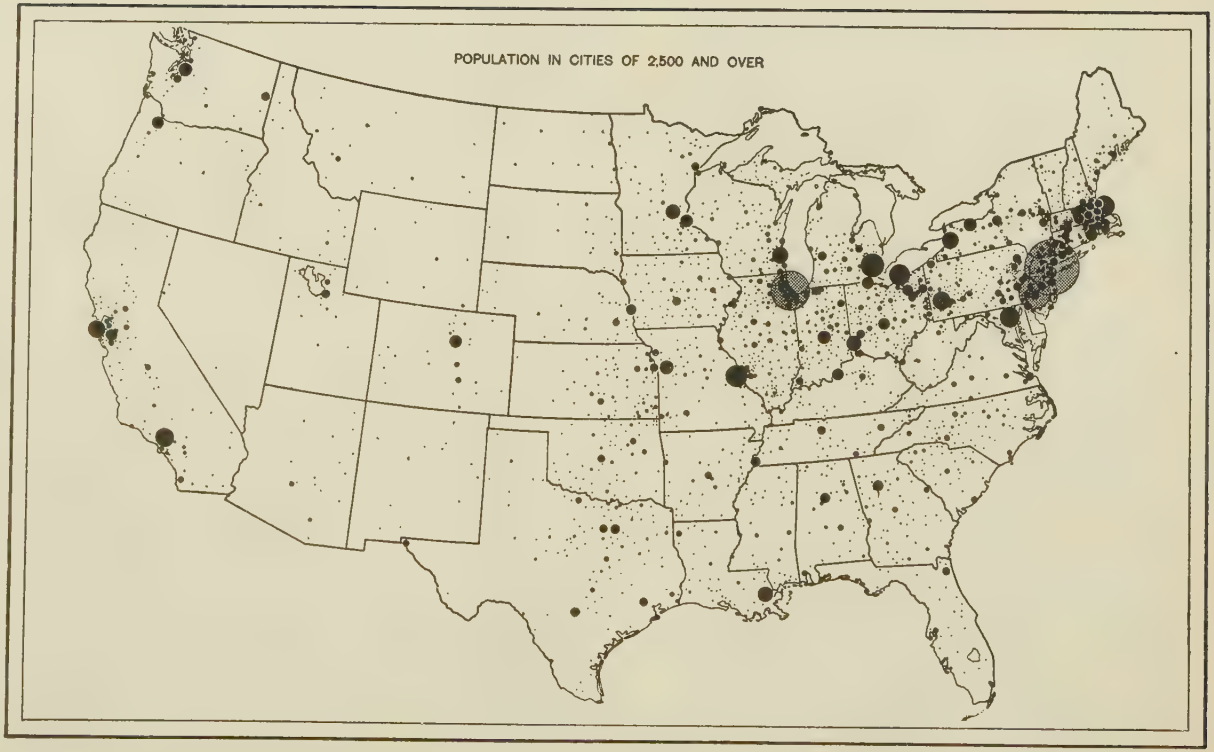

FIG. 139. Urban population, United States. (*U. S. Dept. Agr.*)

The abundance and wide distribution of coal and other sources of mechanical energy (pages 161, 168). The coal annually used in the United States does twenty or more times as much work as is done by the manual labor of the people.

The abundance of iron, copper, lead, zinc, and other minerals upon which the making of machinery and the mechanical industries depend.

The abundance of raw materials for use in manufacturing: cotton, wool, timber, leather, cereals, etc., besides the minerals.

The great food-producing power of the country, making the nation self-sufficient to an unusual degree.

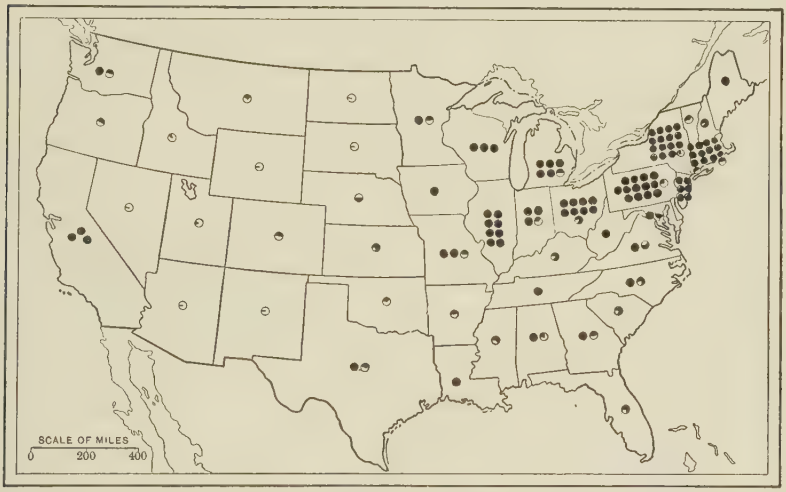

FIG. 140. Number of persons engaged in manufacturing in each state. Each dark circle represents 100,000 persons; each light circle, a fraction of 100,000.

The rapid increase of population due partly to the ease with which desirable land could be secured by settlers, and to the unbounded opportunities for making a living.

The stimulating climate and the abundant rewards for industry and energy. It is doubtful if the people of any other nation work more zealously or enjoy work more than the people of the United States.

The rapid accumulation of wealth, which has built railroads, developed mines, cleared forests, and financed new undertakings of all kinds. In the earlier undertakings, much foreign capital also was employed.

The rapid extension of railways and other means of transportation, made possible by a favorable topography, abundant labor, and the promise of great future traffic.

A strong, helpful government, and a national devotion to education.

An excellent racial stock derived from the foremost European peoples.

The Principal Industrial Region of the United States. — Fully two thirds of the manufactured products of the United States are made in the area shown in Figure 141. This

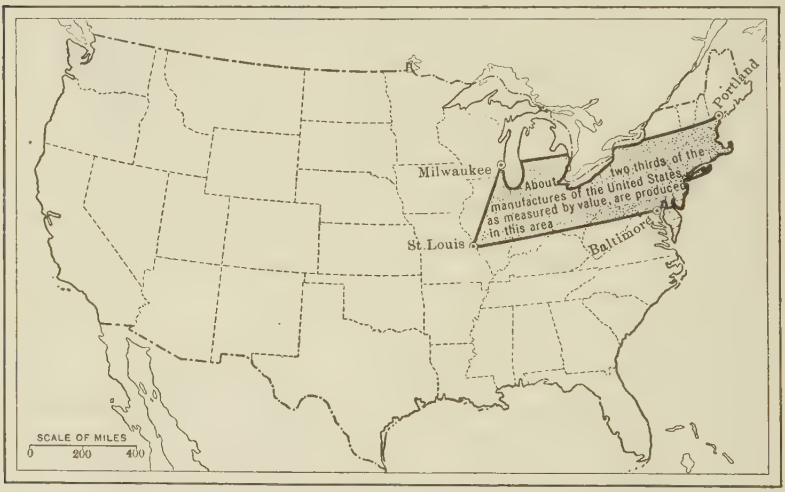
Portland
Milwaukee
About two thirds of the manufactures of the United States, as measured by value, are produced in this area
St. Louis
Baltimore
SCALE OF MILES
0 200 400

Fig. 141. The chief manufacturing region of the United States.

region, extending from Milwaukee to Portland, Maine, on the north side and from St. Louis to Baltimore on the south side, comprises only one tenth of the area of the United States, but includes nineteen of the twenty-five leading manufacturing centers.

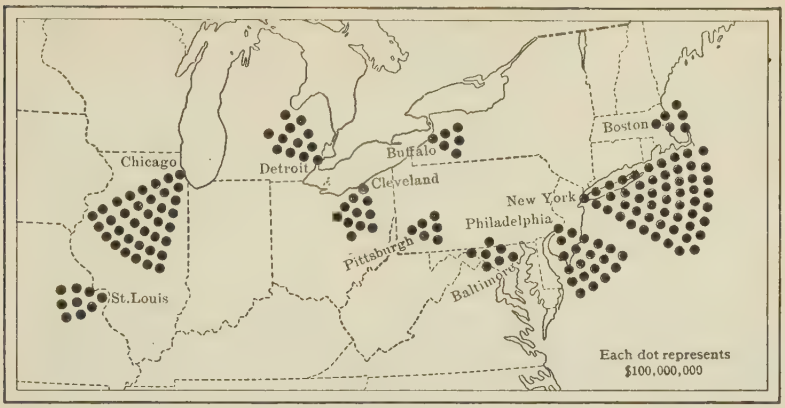

FIG. 142. The ten leading cities of the United States in 1920, in total value of manufactures. Each dot represents $100,000,000 in value of manufactured products in one year.

The reasons for the concentration of manufacturing in the northeastern quarter of the United States are: (1) the presence of much water power and of the best and most abundant coal fields; (2) the best transportation facilities by water and by rail; (3) the convenient meeting ground of coal and iron ore; (4) abundant labor, capital, and markets, although these are effects as well as causes of the great industrial development of the section; (5) the momentum of an early start: New England was the first part of the country to develop factory manufacturing on an extensive scale, and New Englanders carried the industrial spirit westward.

Characteristics of New England Manufactures. — The greater part of New England is poorly suited to farming, but it has an abundance of water power, and its early settlers were an energetic, intelligent, inventive, and thrifty people. The rigorous climate and the prevailingly thin and stony soil made agriculture unprofitable and influenced the inventive Yankees to seek other occupations from which to increase their incomes. This combination of conditions — (1) people, (2) water power, and (3) the scanty profit from agriculture — led to the establish-

ment of little water-driven mills of all sorts throughout southern New England. As the population increased and markets broadened and steam came into use, larger mills and greater diversification of industries followed. New England had the advantage of an early start, but it has been under two disadvantages: (1) the entire absence of native coal, and (2) a limited supply of raw materials within its own borders; both must be brought in from the outside. This combination of conditions has made it most profitable for New England manufacturers to specialize in highly finished products — goods that have very large value per unit of weight or bulk; goods in which much of the value is derived from the labor and skill bestowed upon them.

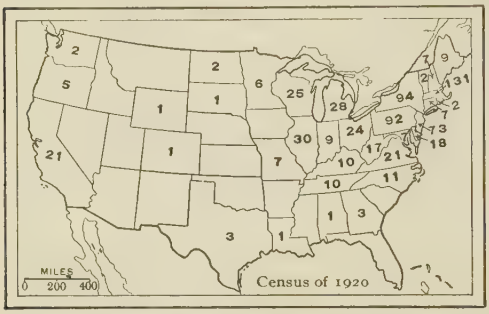

FIG. 143. Number of leather tanneries in each state.

Thus New England has become one of the foremost sections of the country in manufacturing, and especially in the manufacture of cotton and woolen fabrics (Figs. 69, 145, 155), of shoes, hats, silver and brass ware, and of hundreds of things sold in dry-goods stores, drug stores, and hardware stores. For example, four of the five leading shoe-making centers of the country (Lynn, Brockton, Boston, Haverhill) are in eastern Massachusetts; six of the seven chief cotton-manufacturing centers (New

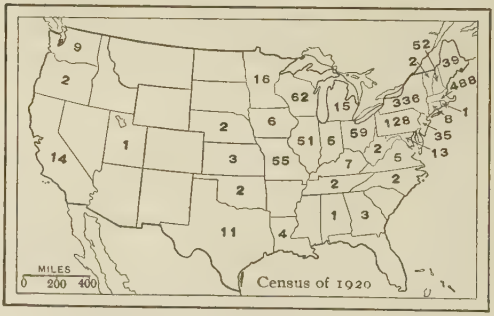

FIG. 144. Number of shoe factories in each state.

Bedford, Fall River, Lowell, Manchester, Providence, and Pawtucket) are in southeastern New England. Lawrence is a chief center of woolen manufactures, Springfield (Massachusetts) of firearms, Providence of jewelry, Danbury of men's hats, Meriden of plated ware, Bridgeport of brass goods, Worcester of wire goods, Beverly of shoe machinery; and scores of other cities and towns likewise have their specialties. So concentrated is manufacturing in Massachusetts, Connecticut, and Rhode Island

FIG. 145. Over 500 cotton-weaving looms in one room of a cotton mill in Fall River, Massachusetts, one of the foremost cotton mill centers of the United States.

that the value of goods made in these states is twenty times as great per square mile as it is in the United States as a whole. If Illinois had in proportion to its area as many cities of over 10,000 population as Massachusetts has, Illinois would have 470 such cities instead of 45, its present number.

The Metropolitan District of New York. — The city of New York has a population of about 6,000,000, which is increased to over 8,000,000 by the suburban territory included in what is known as the Metropolitan District. New York proper has a

FIG. 146. The metropolitan district centering in the city of New York.

larger population than that under the city government of London, and the New York Metropolitan District has a larger population than "Greater London."

The city of New York is the foremost manufacturing center in America and probably in the world. It does not seem possible that so great an industrial development could take place in such a crowded city where land is so expensive and rent so high. Two thirds of the manufacturing of the city is done on Manhattan

Island, where there are 23,000 manufacturing establishments, turning out a value-product of goods[1] about equal to that of the entire United States in 1880 (Fig. 138). What was said (page 234) regarding the large value of New England manufactured goods in proportion to weight or bulk is still more true of those made

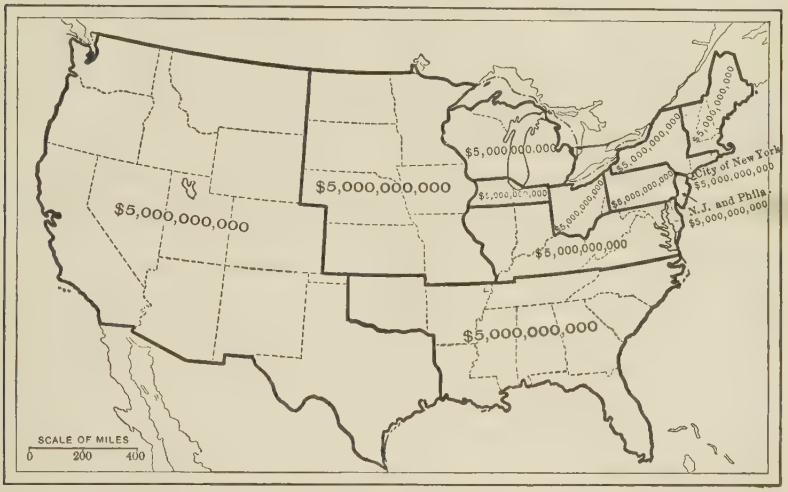

FIG. 147. Each of these twelve regions produced in 1919 about $5,000,000,000 worth of manufactures. The city of New York is one of the units.

in New York, where land is enormously expensive. The remarkable industrial output of New York is based largely upon two conditions that exist there:

(1) New York is the landing place of about three fourths of the immigrants who come to the United States. Most of these people, both men and women, come with little money and are glad to get work at once in the port where they land. Moreover, the immigrant women are willing and industrious workers, and the largest group of industries in the city — the manufacture of women's clothing, millinery, and fur goods — depends largely upon women workers, of whom there are about 130,000. The second greatest industry is the manufacture of men's clothing,

[1] Over $5,000,000,000 in the census year 1919.

shirts, and furnishing goods, employing nearly 60,000 persons, the greater part of whom are immigrants, both men and women.

(2) The second condition favoring manufacturing in New York is the vast foreign and domestic commerce that centers in this district. New York is the greatest exporting and importing city of the country, and the greatest wholesale market. It is the unrivaled financial and mercantile center of the nation, and it is advantageous for manufacturers to be located in or near this chief center of the nation's business. On the shores of New York Bay and its tributary waters, both in New York state and in New Jersey, are many large sugar refineries and metal refineries at the water's edge. They receive raw sugar and metals — especially copper — from many parts of the world, refine them, and ship them to the markets of this country and of the world. On the New Jersey side are enormous oil refineries which are supplied by pipe lines that reach to the inland oil fields (Fig. 103).

Manufacturing in Northern New Jersey. A great many important industries are located in northern New Jersey near New York. Here there is opportunity to secure land for large factories, warehouses, etc., and more than thirty cities ranging in population from 10,000 to 415,000 (Newark) have grown up in this section of the state. Paterson is the leading silk-making city of the world, surpassing even Lyon in France; nearly half of the silk-making establishments of the country are in New Jersey, though the output of Pennsylvania

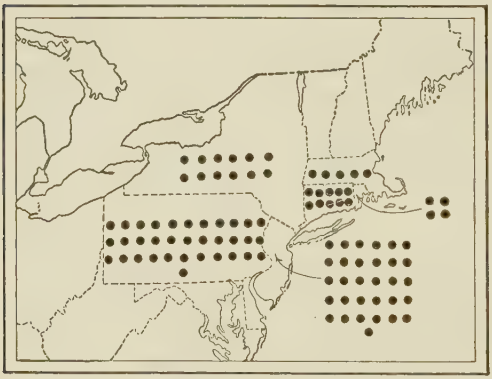

FIG. 148. Each dot represents 1 per cent of the value of silk goods made in the United States in one year.

has greater value. Newark has varied industries, including leather goods, hats, and jewelry. Jersey City, Bayonne, Hoboken, Passaic, Elizabeth, Perth Amboy, and East Orange are other cities of this group, each of which has developed certain important lines of manufacturing. These are all a part of the New York Metropolitan District (Fig. 146), the greatest beehive of industry in America.

The New York Central Chain of Cities. — The route of the Hudson River and Erie Canal, paralleled by the New York Central Railroad from New York by way of Albany to Buffalo, is marked by a chain of about twenty-five good-sized manufacturing cities, including Yonkers with its carpet mills; Albany, the state capital; Troy, which makes the greater part of the collars and dress shirts of the nation; Utica and the other Mohawk Valley cities with their great knitting mills and cotton mills; Schenectady with its enormous plants devoted to electrical manufactures and locomotives; Syracuse, with its varied industries; Rochester, principal American center of optical manufactures; Niagara Falls with its electro-chemical industries based upon the water power; and Buffalo, the second city of New York, with a wide range of industries. A little north of the Mohawk Valley are the two leading leather glove making centers of the country — Gloversville and Johnstown.

The Philadelphia-Baltimore Region. — Another important manufacturing district extends from Trenton, New Jersey, one of the two principal pottery centers of the country, to Baltimore on Chesapeake Bay.

Of this group of cities Philadelphia (with Camden across the Delaware) seems to possess the greatest number of advantages of location and has become one of the outstanding manufacturing cities of the country. Its well-protected harbor and its nearness to the Pennsylvania coal fields have contributed to its growth; but an equally effective influence is the fact that this city, for more than a century, has been an eastern terminus of one of the chief traffic routes between the interior of the country and the Atlantic seaboard. In the days of the stagecoach and freight

wagon, Philadelphia was the eastern terminus of the highroad to the Ohio Valley at Pittsburgh. Later, it was the eastern terminus of the Pennsylvania Canal, which followed nearly the same route; and still later it became a terminus of the Pennsylvania Railroad system, one of the largest in the United States. Thus the city has long been one of the main gateways of the continent, and its advantageous location naturally gave rise to manufacturing industries, in many of which this city leads all other centers. Its locomotive works, car works, textile and knitting mills, rug factories, tanneries, and leather-working establishments are among the largest in America, and its sugar refineries and oil refineries are of great size. It is the principal center of our eastern shipbuilding industries, which are located at Philadelphia, Camden, Chester, Wilmington, Newport News, and other points.

Baltimore is the most southerly of our large industrial cities on the Atlantic coast, and its clothing, fertilizer, chemical, and sheet-metal industries are important. It is the chief port of the American oyster industry and is one of the chief vegetable-canning centers of the East.

The Iron and Steel Industries of Pennsylvania. — Before the discovery of the Lake Superior iron ores, Pennsylvania was the leading iron-mining state of the Union. Also it is virtually the only state that yields anthracite, which at one time was used in smelting iron ore. Later, when coke became the preferred fuel for iron smelting, Pennsylvania was found to have the best coking coal (page 164). All these favoring conditions have combined to make Pennsylvania the leading state in the working of iron and steel. The great center is Pittsburgh, where Lake Superior ore, Connellsville coke, excellent bituminous coal, and abundant limestone are economically assembled. But there are many other steel-making centers in the state, east, center, and west. Over one third of all the blast furnaces in the United States are in Pennsylvania, and about 38 per cent of the pig iron and steel made in the country is made in that state. The location of the blast furnaces is shown in Figure 149 (see also pages 180–182).

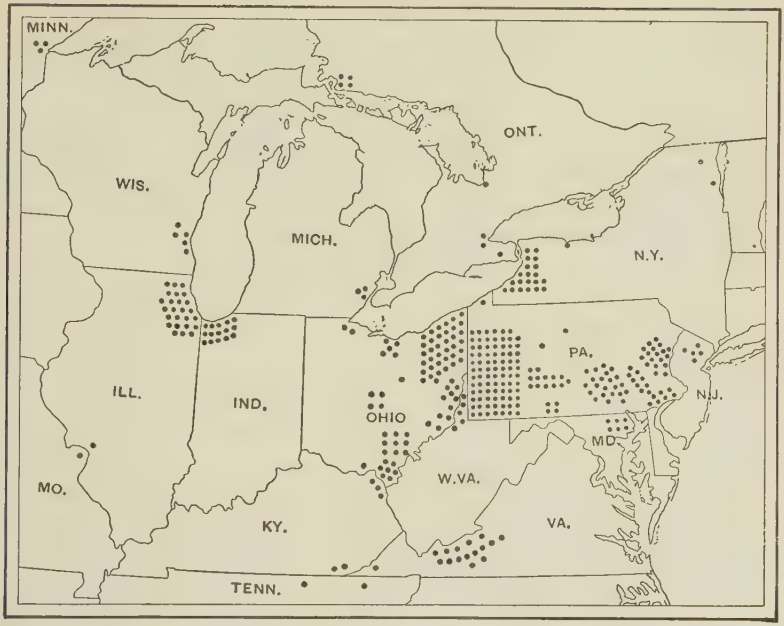

FIG. 149. Blast furnaces using coke for fuel, and iron ore mainly from the Lake Superior region. Some eastern furnaces use ore from the eastern states and from abroad.

The Many and Varied Manufacturing Industries of Ohio. — In many ways Ohio, Indiana, and Illinois occupy an exceedingly strategic part of the United States. All the great east-west trunk railroads between the interior and the Atlantic Ocean pass through these states. All are rich in coal of good quality; all have petroleum; all have lake ports at which iron ore is received; they are nearly in the center of population and industry, and they are excellent agricultural states. Responding to many natural advantages, Ohio has become the home of industries of great variety. From Cleveland, through Youngstown to Pittsburgh, extends an almost continuous line of steel-working cities. Cleveland itself is one of five principal manufacturing cities of the country, with a very wide range of products, but leaning

strongly to machinery, automobiles, steel ships, and other metal products. Akron is the chief manufacturer of rubber products in the world. Cincinnati lies somewhat south of the steel-working section, and its leading industries (meat, clothing, foundry products, shoes) depend much less upon steel than do those of the other cities mentioned. Ohio has five other cities whose value-product of manufactures in 1919 exceeded $100,000,000 each: Toledo, Columbus, Dayton, Canton, and Lorain.

The Automobile Industry. — The chief centers of the country for making carriages and wagons depend largely upon the hardwood forests lying south of the Great Lakes. When horse-drawn vehicles gave place to motor vehicles, many of the former carriage and wagon manufacturers took up the manufacture of automobiles, and the principal centers of the new industry are now in this central hardwood belt, including Ohio, Indiana, Illinois, and Wisconsin, and especially Michigan. Detroit is the unrivaled automobile city; its most famous plant turns out five or six cars a minute. Detroit has about 1,000,000 population, and more than half of the industrial employees of the city and its suburbs are engaged in occupations connected with the manufacture of automobiles. In 1920 Detroit had about twenty-five important plants that made or assembled motor vehicles, and 130 companies whose sole or principal business was the manufacture of automobile parts and accessories; the city sends out an average of one motor vehicle every six seconds. Several other Michigan cities are important for automobile manufacturing, notably Flint, Lansing, and Pontiac; Cleveland and Indianapolis are also leading centers (Fig. 151). The American automobile industry has had a growth unparalleled in history, and the value of automobiles made in the United States in 1920 was greater than that of all the manufactures made in the entire country in any year prior to the Civil War. The number of persons employed in making automobiles and parts, in repairing them, running them, selling them, and transporting them, runs into the millions. Among the hundreds of manufacturing industries of the country, the making of automobiles ranks third, its output

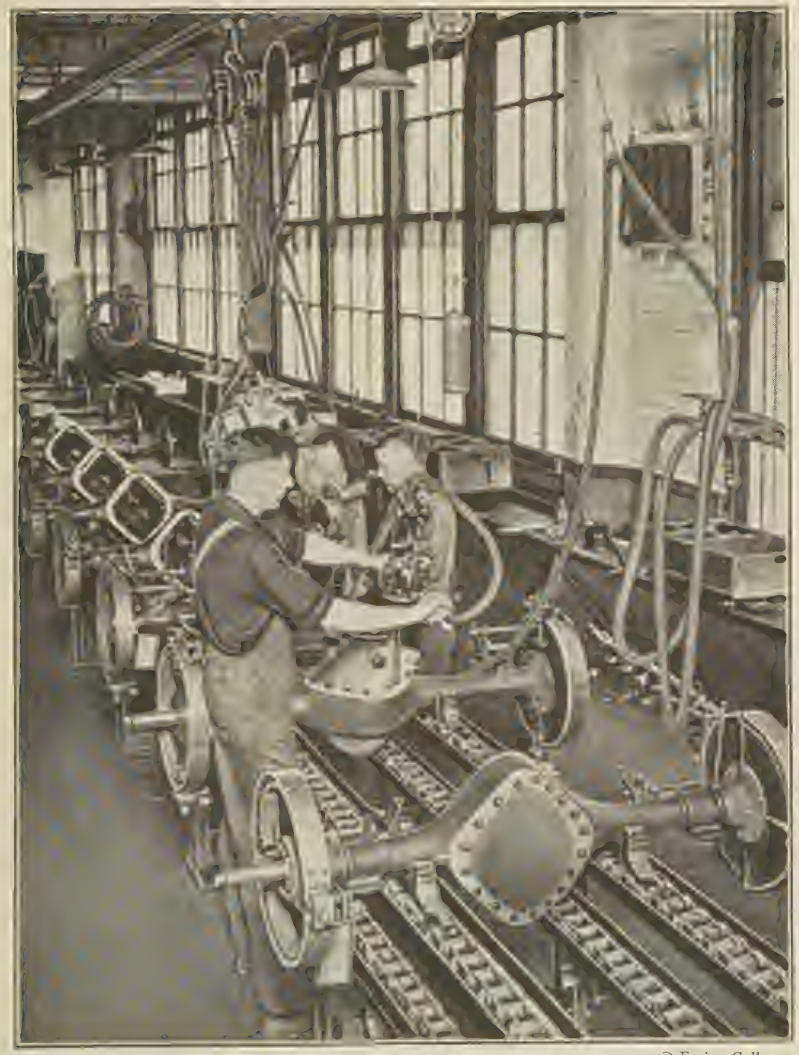

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FIG. 150. Workmen assembling rear axles on a chain conveyer in an automobile factory in Detroit, Michigan.

being exceeded only by meat products and the products of iron and steel works and rolling mills. The automobile industry advanced from eighth place in 1914 to third place in 1919. The

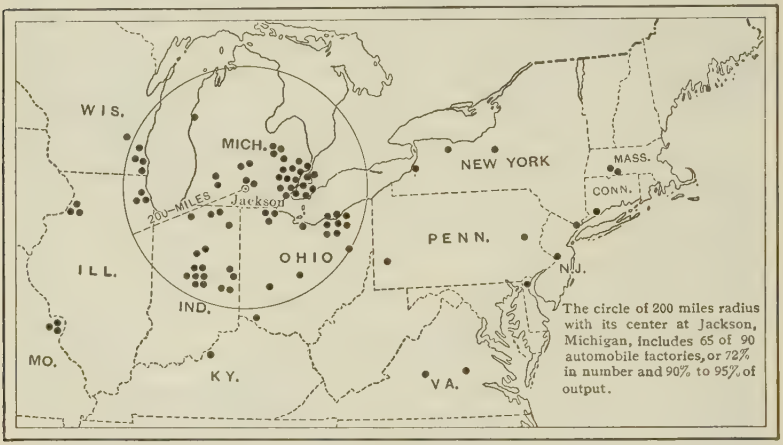

FIG. 151. Location of automobile factories.[1]

remarkable concentration of this industry in a relatively small area is shown in Figure 151.

The Chicago District. — Chicago is the second American city in population and in manufacturing. If we omit California, the value of all the manufactured goods made in the western half of the United States about equals the output of Chicago alone. Within the memory of people still living, this city was scarcely more than a village, but to-day it is the chief railway center of the country, for practically every important railway west of the Appalachians runs trains into Chicago. This city owes its wonderful growth in large part to its location near the southern end of Lake Michigan. All the trunk lines from the East must pass south of Lake Michigan and all the lines from the Northwest

[1] The value of motor vehicles made in leading states in one year was, in round numbers: Michigan, $1,620,000,000; Ohio, $380,000,000; Indiana, $180,000,000; New York, $210,000,000; Wisconsin, $120,000,000; Pennsylvania, $115,000,000; Illinois, $105,000,000; Missouri, $70,000,000; New Jersey, $55,000,000.

must bend southward around this lake to meet the lines extending eastward. Moreover, at one time the lake commerce of Chicago was important and the city was an active transshipping point between rail and lake. All these factors made Chicago so important as a traffic center that railroads from the West, Southwest and South all sought to reach the city, and it became the focus of the largest railway traffic in the world. The Central States are both producers and consumers on a large scale, and some centrally located city must act as the principal collecting and distributing market for this region.

Chicago has many kinds of manufacturing in which it ranks first or among the first, but its slaughtering and meat-packing industry is the most prominent. It has more than twenty

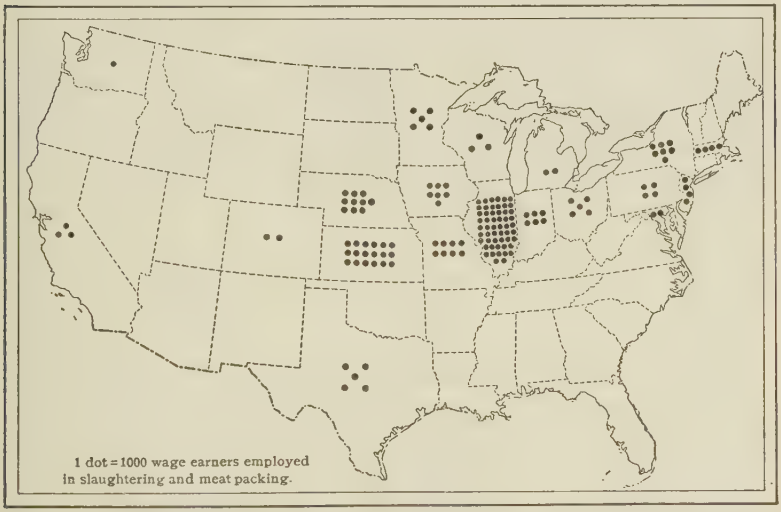

FIG. 152. Comparative numbers of persons engaged in slaughtering and meat packing. (*U. S. Dept. Agr.*) Compare with Figure 72.

packing plants, and in them nearly one fourth of the wholesale slaughtering of the country is done. Many immigrant laborers are employed in the manufacture of men's and women's clothing, and in this industry Chicago ranks second only to New York.

The city's industries devoted to iron and steel products are large and varied, including car-building plants and agricultural-implement factories that rank among the largest in the country. Its manufacturing industries as a whole differ from those of New York in that land has been much more abundant and factories of large size could be built. Chicago products are in a large degree made from raw materials produced in the Middle West and are to a noteworthy extent made for use in the great agricultural interior of the country. This characteristic of Chicago's industries is, however, becoming less prominent as the years pass.

The Chicago district includes the steel city of Gary and others in northern Indiana, a number of cities near Chicago, and three in southern Wisconsin — Milwaukee, Racine, and Kenosha — all of which are distinctively manufacturing centers especially devoted to the manufacture of machinery, farm implements, automobiles, and metal products generally. Milwaukee is the chief leather-tanning city of the West. Most of the cities of the Chicago group have profited and still profit somewhat by their position on the navigable waters of Lake Michigan.

The Twin Cities, Minneapolis and St. Paul. — Geographical reasons caused two cities to grow up near together on the upper Mississippi. One, St. Paul, marks the head of navigation on the Mississippi from the south, and the other, Minneapolis, owes its location and early growth to the water power of the Falls of St. Anthony, a few miles farther up the river. The two cities have grown into one, in many respects, but have separate city governments.

Minneapolis is known the world over for its flour mills, and it is only slightly less well known in the West for its lumber interests, which once exceeded those of the flour mills. Its twenty-three modern flour mills and its many huge storage elevators looming up on the sky line are the most conspicuous features of the city. Minneapolis lies not only on the eastern margin of the spring wheat belt (and on the southern margin of the former great pine forests), but also on the eastern margin of the flax-

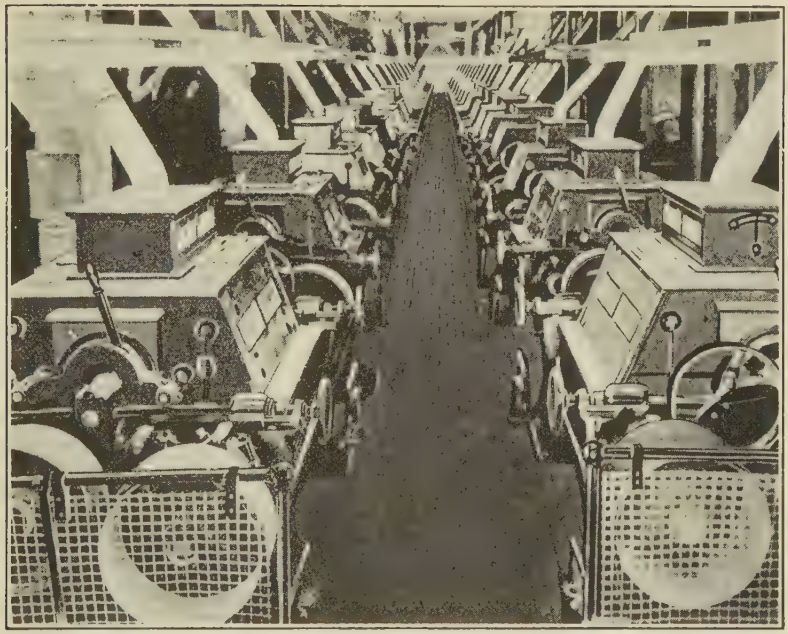

FIG. 153. Interior of one of the immense flour mills of Minneapolis. On the floor here shown are 250 wheat-grinding machines.

growing region, and it is one of the principal linseed-oil centers of the country.

St. Paul is more largely a mercantile, banking, and general business city than an industrial center, although in the manufacture of butter, of meat products, of shoes, and of hardware it ranks high. The Twin Cities are the great gateway of the railroads into Canada and the Northwest.

St. Louis and the Missouri River Cities. — St. Louis also has a highly strategic location, lying near the meeting place of five water routes — the Ohio, the lower Mississippi, the Missouri, the upper Mississippi, and the Illinois, which is joined by canal to the Great Lakes. While these waterways are no longer of large importance, they made St. Louis for several decades the focus of the most important traffic routes of the Mississippi

Valley; and the commanding situation of the city drew to it a large number of railroad arteries. It is at the meeting ground of North, South, West, and Southwest; is one of the great distributing centers of the country, and ranks sixth in population and in value of manufactures among the cities of the United States. Its manufactures are varied and no one stands out to any such degree as do flour in Minneapolis, automobiles in Detroit, or meat packing in Chicago. It is, however, one of the important meat-packing, flour-milling, and tobacco-manufacturing cities of the Middle West, and is the largest manufacturer of shoes outside of the Boston district. Its position with relation to the Southwest is much like that of St. Paul and Minneapolis in relation to the Northwest.

Kansas City, Missouri, and its smaller neighbor, Kansas City, Kansas, are at the big bend of the Missouri River where it turns almost directly toward the east from its previously southerly course. This bend in the river caused it to become a point for the divergence of early overland routes into the West, and it has shared with St. Louis the distributing trade of the vast country lying to the southwest. It ranks second only to Chicago as a slaughtering and meat-packing center and as a central market between the grazing states of the Great Plains and the Corn Belt (Fig. 9). Three other cities on the Missouri River are great cattle markets and meat-packing cities: Omaha, Sioux City, and St. Joseph.

The Mountain and Pacific States. — Manufacturing on a large scale is an industry belonging to the thickly populated parts of a country. Its demands for skilled laborers, highly perfected transportation facilities, abundant capital, raw materials, fuel, and markets necessarily limit extensive manufacturing to those parts of the country which can supply these demands. The western half of the United States is prevailingly mountainous, and the greater part of it is arid or semi-arid, two conditions which must permanently restrict the growth of population. On the Pacific Coast conditions are more favorable, a rapidly growing population is in possession of the coast regions, and manufactur-

ing is making good progress. Figures 140 and 147 show the relatively small development of manufacturing in most of the West.

In the Mountain States such manufacturing as exists is intimately connected with the raw products of those states. There are iron works of large size in Colorado, smelters of copper, lead, and silver ores in many places, beet sugar factories especially in Colorado, Utah, California, Nebraska, and Idaho (Figs. 47, 48), and great lumber mills in the Northwest. California has developed manufacturing industries whose products in a good year reach $2,000,000,000. Its fruit-canning and fruit-drying industries are large. San Francisco and Los Angeles are the chief industrial centers. The magnitude of the moving picture interests centering in Los Angeles is well known. Washington

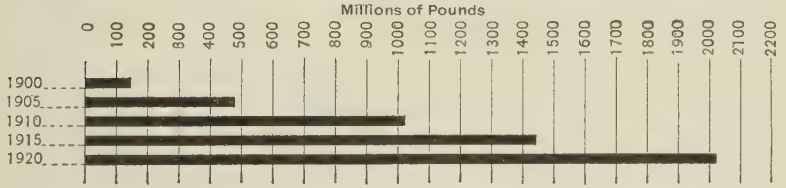

FIG. 154. Annual production of beet sugar in the United States.

and Oregon have lumber mills of great capacity, and the canning of salmon in these states (and still more in Alaska) is a large industry (page 155).

The Southern States. — The South has always been interested in agriculture more than in manufacturing. Its mild winters permit working out of doors for a longer season than is possible in the North, and all the conditions, as well as the tastes of the people, have favored a dominantly agricultural civilization. In places the people oppose the establishment of factories with their smoke and their industrial laborers. In addition to these conditions, relatively few immigrants go to the southern states; white laborers are therefore not abundant, and capital for investment is less available than it is in the North. Nevertheless, a high development of cotton manufacturing has taken place, especially in the Piedmont region of the Carolinas and Georgia

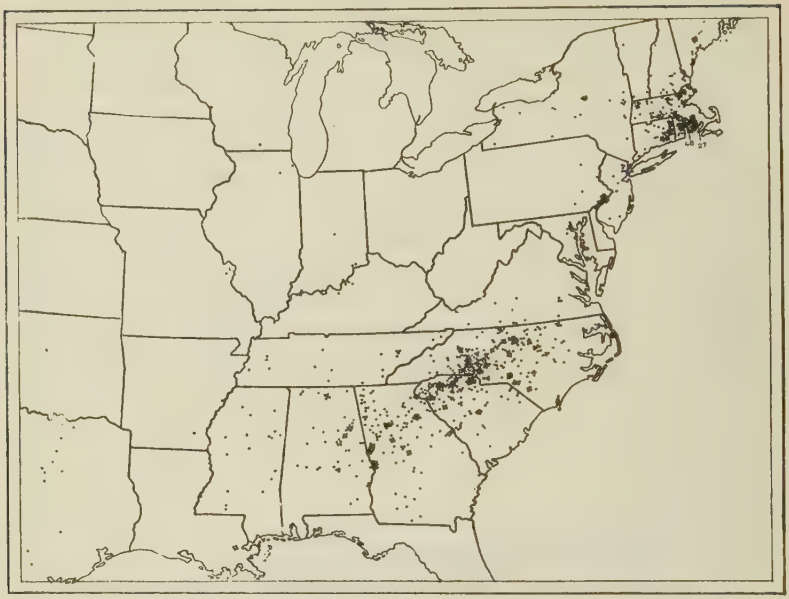

FIG. 155. Location of the cotton mills in the United States. Each dot represents a cotton mill. (*U. S. Dept. Agr.*) Compare with Figure 58.

(Figs. 51, 155), and more cotton is used in southern mills than in northern, though the number of spindles in the North still exceeds the number in the South.

The South is the principal producer of tobacco, and tobacco manufacturing has become another characteristic southern industry, notably in North Carolina, Virginia, and Kentucky. The pine forests of the South are now the nation's largest source of lumber, and its sole source of naval stores (page 143). Of the ten leading lumber states seven are in the South, and southern yellow pine forms about 25 per cent of the lumber cut in the country. There are also in the Middle South many furniture factories using mainly the hard woods.

Of the leading manufacturing cities of the United States, seven besides Baltimore (page 240) are in the South: Louisville, Kentucky; Winston-Salem, North Carolina; New Orleans,

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FIG. 156. Iron and steel works in Birmingham, Alabama. With coal, iron ore, and limestone in the immediate vicinity, Birmingham has become one of the important iron and steel centers of the country.

Louisiana; Richmond, Virginia; Birmingham, Alabama; Memphis, Tennessee; and Atlanta, Georgia.

SUMMARY

The five leading states in value of manufactures: New York, Pennsylvania, Illinois, Ohio, Massachusetts.

The five leading cities in value of manufactures: New York, Chicago, Philadelphia, Detroit, Cleveland.

The five leading groups of manufactures in the United States according to total amount of wages paid: Iron and steel products, textiles and their products, lumber and its manufactures, food and kindred products, paper and printing.

The five leading articles of manufacture according to total annual value: Meat products, products of iron and steel works and rolling mills, automobiles, foundry and machine shop products, cotton goods.

Exercise

Where. — 1. Where in the United States are

(*a*) cotton mills most numerous?
(*b*) the great meat-packing centers?
(*c*) wood-pulp mills most numerous?
(*d*) the shoe factories mostly concentrated?
(*e*) fruit and vegetable canning and preserving most extensive?
(*f*) iron smelting and steel making most highly developed?
(*g*) automobile centers chiefly located?
(*h*) men's clothing and women's clothing mostly made?
(*i*) beet sugar mills most numerous?
(*j*) cane sugar refineries chiefly located?
(*k*) agricultural machinery plants mainly found?

2. Give at least one good reason for the location of the industry in each of the above cases.

Outline Map Exercise. — On an outline map of the United States place a dot to represent each of the following cities; name each city and number it to correspond to the number of the city in the list. The cities are arranged according to the value of manufactured goods produced, as shown by the census of 1919.

1. New York	2. Chicago	3. Philadelphia
4. Detroit	5. Cleveland	6. St. Louis
7. Baltimore	8. Buffalo	9. Boston
10. Pittsburgh	11. Newark, N. J.	12. Milwaukee
13. Akron, Ohio	14. Cincinnati	15. Minneapolis
16. Kansas City, Kan.	17. Omaha	18. San Francisco
19. Indianapolis	20. Jersey City	21. Rochester
22. Toledo	23. Los Angeles	24. Flint, Mich.
25. Seattle	26. Providence	27. Bayonne, N. J.
28. Youngstown, Ohio	29. Perth Amboy, N. J.	30. Camden, N. J.
31. Paterson, N. J.	32. New Bedford, Mass.	33. Worcester, Mass.
34. Bridgeport, Conn.	35. Louisville, Ky.	36. Winston-Salem, N. C.

37. Portland, Ore. 38. Kansas City, Mo. 39. Columbus, Ohio
40. Lawrence, Mass. 41. New Orleans 42. Dayton, Ohio
43. Fall River, Mass. 44. Lynn, Mass. 45. Richmond, Va.

Suggest or recall some line of manufacturing that you would expect to be prominent in each of the above cities.

Why. — 1. Why has manufacturing grown with great rapidity in the United States?

2. Why is the Cleveland-Pittsburgh region especially well located for iron and steel industries?

3. Why are the states between the Great Lakes and the Ohio River well situated for manufacturing?

4. Why is there more manufacturing in the North than in the South? In the East than in the West?

5. Why are the cane sugar refineries on the coast? Why are there more on the east coast than on the west?

6. Why are good transportation facilities essential in modern manufacturing? Answer fully.

7. Why are Minneapolis and Kansas City favorably situated for flour milling?

8. Why is Cleveland better situated than Cincinnati for iron and steel working?

9. Why does New England specialize in manufactures of the lighter, more highly finished, and more expensive type?

10. Why has the location of Chicago been favorable to its growth?

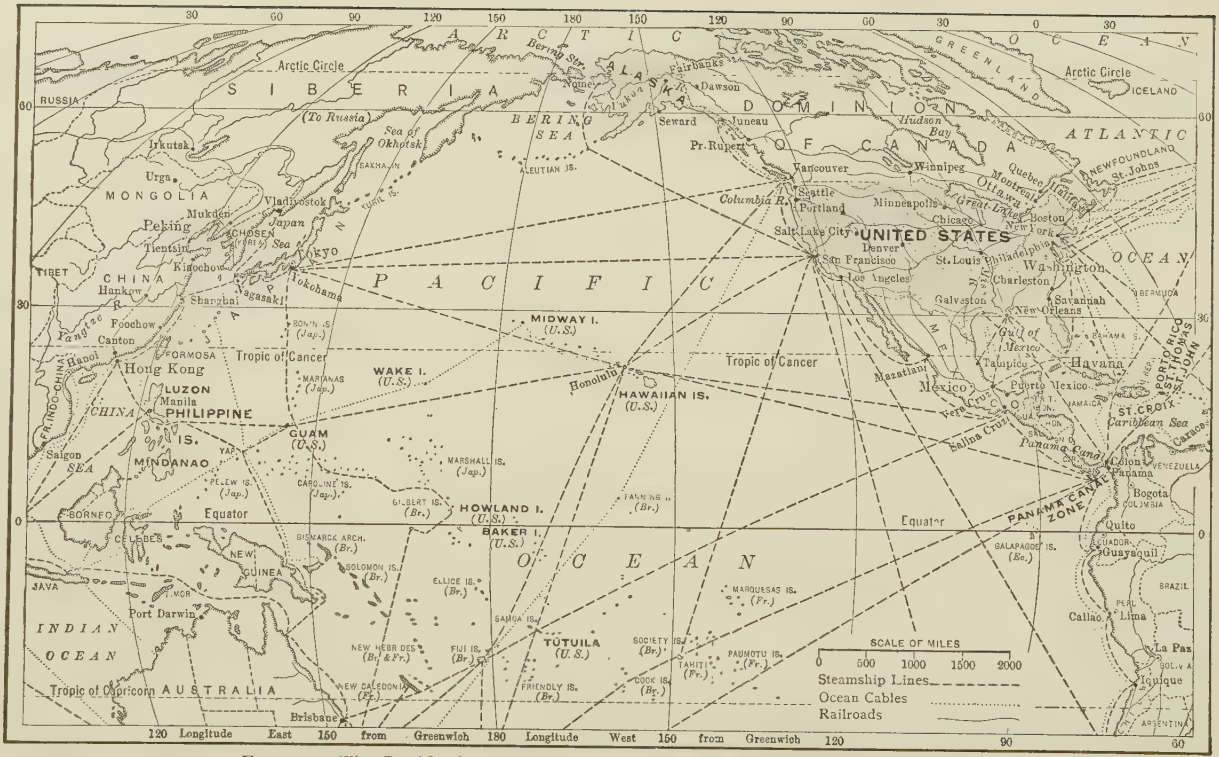

FIG. 157. The Pacific Ocean; the United States and its outlying possessions.

CHAPTER XIII

THE UNITED STATES IN THE PACIFIC

The United States took relatively little interest in the affairs of the Pacific until the Spanish-American War in 1898. The people of the Hawaiian Islands had previously asked to have the islands annexed to the United States and had been refused. But our first battle in the war with Spain was Dewey's naval victory in Manila Bay, in the Philippine Islands. We then promptly accepted the Hawaiian Islands, later took possession of the Philippines and Guam, and entered upon an entirely new policy in the Pacific. Since then we have built the Panama Canal and developed an active interest in Chinese affairs, and to-day the United States regards its interest in the Pacific as nearly, if not quite, equal to its interest in the Atlantic.

The Hawaiian Islands

Hawaii, a group of volcanic islands in the mid-Pacific, was annexed to the United States in 1898 at the request of the people of the islands. It forms a territory of the Union, and its citizens are citizens of the United States. It has a delegate in Congress the same as Alaska has. There are nine inhabited islands, the largest of which, Hawaii, is half the size of New Jersey. The area of all the islands is about 6500 square miles, and their population is upwards of 260,000, made up chiefly of Japanese, Chinese, Portuguese, Americans, and native Hawaiians. This group of islands, 2000 miles southwest of San Francisco, is called "The cross-roads of the Pacific." It occupies a most strategic position, is an important naval base for the United States navy, and a landing place for the United States cable to the Far East. The chief city, Honolulu, is a port of call for many steamship lines.

Sugar; Pineapples. — The islands lie just within the tropics and have a delightful climate. Sugar cane, largely raised under irrigation, has become the principal crop; the islands produce more sugar per acre than any other important region in the world. There is plenty of American capital to finance the industry, and large modern sugar mills have been built; most of the raw sugar comes to the United States, where it is refined and used. These islands produce nearly twice as much sugar as the Philippines, and constitute one of the important sources of supply for the United States.

The other characteristic product is the pineapple, which is grown on thousands of acres; the canned fruit is exported to the extent of 5,000,000 cases a year (Fig. 159).

Prosperity. — The annual exports of the Hawaiian Islands amount to about $400 for every man, woman, and child in the territory. This is several times the per capita exports of the United States and greater than those of any European nation.

Fig. 158. Planting cuttings of sugar cane in the Hawaiian Islands.

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FIG. 159. Pineapple field in the Hawaiian Islands. The growing of pineapples is second only to the growing of sugar in the Islands.

These little islands, with slightly more than a quarter of a million people, buy more American goods than some of the South American countries that have ten or twenty times as many people. The islands have been made prosperous by good government, good schools, abundant capital, and an energetic population.

GUAM AND SAMOA

The small islands in the south Pacific owned by the United States are of value chiefly as naval stations and cable stations. Guam has 210 square miles and about 15,000 people, while Tutuila and the other American islands of the Samoan group have only 77 square miles and 8000 people. The products and commerce of the islands are of small consequence.

THE PHILIPPINE ISLANDS

The Islands and their Location. – The Philippine group consists of upwards of 3,000 islands and islets, but the largest eleven

make up 92 per cent of the land area of the archipelago. Two of the islands — Luzon and Mindanao — are each about as large as Indiana, while the whole group comprises an area nearly as large as that of the British Isles or Japan. The islands are mountainous and volcanic. From a third to a half of the land is covered with dense forests, mostly owned by the government.

The Philippines lie north of the equator, but wholly within the tropics. They are sometimes regarded as a part of the extensive group known as the East Indies. The main island, Luzon, is about 500 miles from the mainland of Asia, and 6000 miles from San Francisco.

People. — The people of the Philippines number more than 10,000,000. They consist of several groups, differing considerably among themselves and speaking different languages and dialects. The great majority, however, belong to the same Malayan racial stock, and are the descendants of invaders and conquerors who entered the islands long ago. One small, very dark-colored tribe — the *Negritos* — apparently are the aborigines, and differ markedly from the dominant Malayans. Nearly all the peoples of the islands are civilized, and over 90 per cent are Christian in religion; these are called *Filipinos*. The *Igorots* are one of the several pagan tribes, formerly accustomed to head hunting, but gradually yielding to civilization. The *Moros* are warlike peoples who profess the Mohammedan religion.

Spanish was, and still is, spoken by the educated class, but all the schools teach English, and the rising generation is increasingly familiar with that language.

Government and Education. — The islands were discovered by Magellan in 1521, and remained under Spanish control until 1898, after which they were taken over by the United States with the expectation that they would be given independence as soon as practicable. From time to time the islands have been given a larger degree of self-government, and they now elect their own congress, judiciary, and local officers; but the governor

and vice governor are appointed by the President of the United States. A majority of the people are said to desire independence, at least to the degree possessed by Cuba, but in the United States there is a divided opinion regarding the wisdom of granting the Philippines a larger degree of independence for some years to come.

Education has made remarkable progress; more than 5000 schools, taught by both native teachers and American teachers, are distributed throughout the islands. The Filipinos seem eager for education; many go on to the high schools and to the National University at Manila, and hundreds attend higher schools in the United States.

Natural Wealth of the Islands. — Great stretches of the land are clad in forests of the finest tropical variety, and these will eventually be a source of wealth. What is known of the geology of the islands warrants the belief that minerals may be found in considerable quantities, but up to the present the output of minerals has been unimportant. The fisheries are a large source of food; thousands of people combine fishing and farming, and fish form a regular item in the diet of the people. The soil is, above all, the great resource of the islands, and from it the greater part of the wealth is derived.

The Leading Agricultural Products. — *Rice* is a nearly universal food in the Philippines, as it is throughout the Far East.

RICE 40%	SUGAR 16%	COCONUT PRODUCTS 16%	ABACA (Hemp) 15%	CORN, TOBACCO, MISC. 13%

FIG. 160. Agricultural products of the Philippines; percentage of the total value of Philippine products.

Nearly half of the cultivated land of the islands is devoted to this crop, yet not enough is grown to supply the home demand. The steady, plodding water buffalo (carabao) is almost essential in rice cultivation, but this faithful animal was nearly swept from the islands by the ravages of a disease (the rinderpest) some years ago.

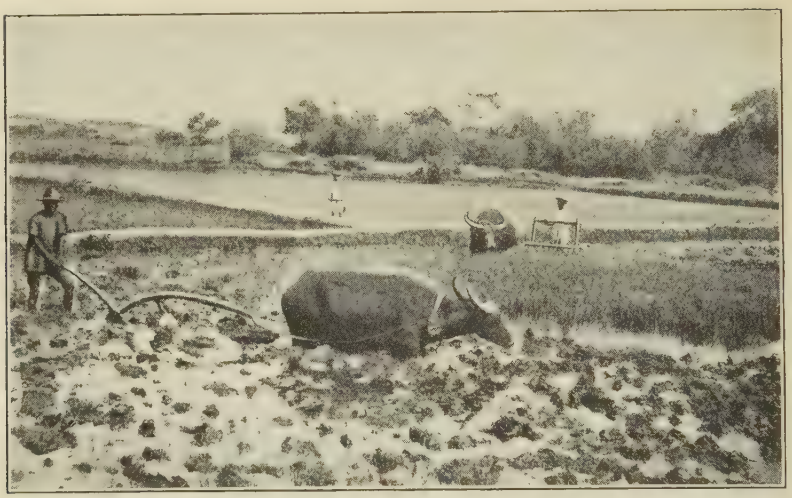

FIG. 161. Plowing a Philippine rice field with the water buffalo, the only draft animal that seems suited to this type of work.

Manila hemp (*abaca*) is the chief money crop of the small farmers of the Philippines, and these islands are the only place where it grows successfully. The plant resembles the banana plant, and its long leaf-stems contain a tough fiber which is made into rope and other forms of cordage, into mats, braid for hats, etc. This fiber is a large item in the exports, but fluctuates greatly with ups and downs of the American demand, for the greater part of it comes to the United States.

Copra and coconut oil form a leading export of the Philippines. Copra is the dried meat of the coconut. There are about 70,000,000 coconut trees in the islands, and at times the Philippines have been the largest producer of coconuts in the world. The rich, white meat of this nut is full of oil, which has come into great demand as a constituent of cooking oils and butter substitutes, and of soaps. In fact, one of the most notable developments in the commerce of recent years has been the rapidly increasing demand for vegetable oils, including the oil of the soy bean, the cotton seed, the palm kernel, the olive,

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FIG. 162. Filipinos cutting open the coconuts which supply copra and coconut oil.

the coconut, and the peanut. The United States imports more than $100,000,000 worth of these oils yearly, and the Philippine Islands are one of the three main sources.

Sugar and tobacco. The Philippines are ideally suited to the production of both sugar and tobacco, and these are among the leading products. For various reasons, however, the output of sugar falls below that of Hawaii and Porto Rico, and far below that of Cuba. Perhaps the chief reason is that into the latter islands, which are much nearer the United States, American capital has gone more freely, and has built the great modern sugar mills which are so essential to the economical production of raw sugar. When the profit on sugar is small, the long sea voyage between the Philippines and the United States may give the deciding advantage to islands that are near our coasts.

Manufacturing. — Manufacturing is slowly gaining headway in the Philippines, but tropical peoples do not engage largely in this industry. Such manufacturing as is carried on consists of (1) household industries, especially weaving, and (2) factory industries which use the agricultural and forest products of the islands; for example, rice polishing, sugar making, oil pressing, tobacco and cigar manufacture. About 40,000 persons are employed in the tobacco factories of Manila, the capital and chief city.

Transportation and Commerce. — Commendable progress in road building has been made. In 1923 there were over 3000 miles of hard-surfaced roads, and a still larger mileage of improved country roads of fair quality. The Philippines have constructed more miles of good roads in twenty years than Colombia, Venezuela, Ecuador, and Peru combined have constructed in a hundred years. Owing to the large number of islands, transportation by boats is common, and this limits the need of railroads, of which about 800 miles have been built.

About two thirds of the foreign trade of the Philippines is with the United States, with which country free trade exists. The foreign trade increased 600 per cent during the first twenty years of American control. Excellent as this is, the Hawaiian Islands, with one fortieth as many people and one eighteenth as much land, export a greater value of products than the Philippines. This is mainly due to the advanced modern methods of producing sugar and pineapples in Hawaii.

Alaska

The United States bought Alaska from Russia in 1867, paying for it $7,200,000. This territory has twice the area of Texas or Germany, but the population is very small — 55,000 in 1920, about half of whom are Indians and Eskimos. The population declined somewhat between 1910 and 1920.

Character of the Country. — About two fifths of the area is composed of mountains. The forests are extensive, but not particularly valuable for lumber, and only a very small fraction of the land can be used for any type of agriculture; in 1920 only

6000 acres were under cultivation. The southeastern coast is a region of wild and imposing beauty, with its lofty mountains rising from the sea, and its many glaciers, fiords, winding straits, and wooded islands.

Mineral Wealth. — The gold fields of the Yukon and Nome appear to be nearly worked out, but gold is still a product of

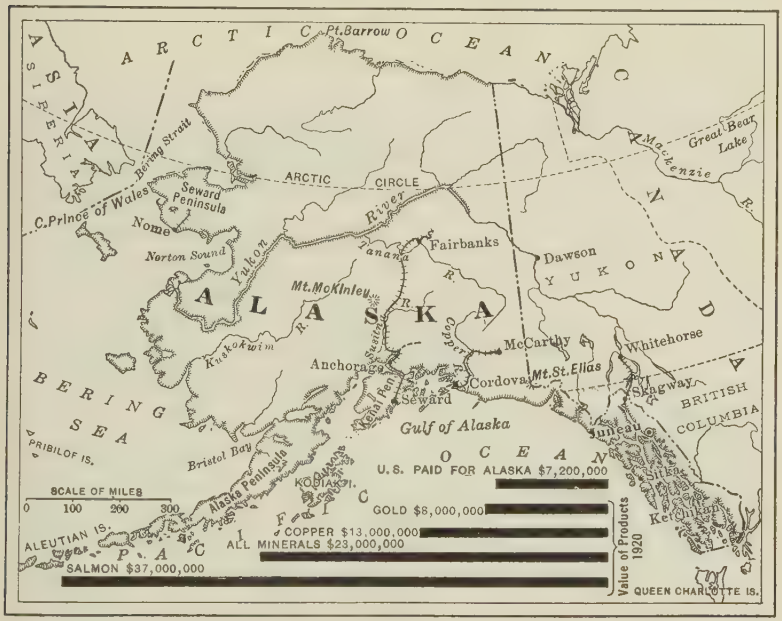


FIG. 163. The valuable territory of Alaska: relation between the purchase price and the value of products for one year.

importance, though less so than formerly. Coal is abundant and some is of good quality, but it is difficult and expensive to mine, and much of it is low grade. Copper is the leading mineral, and Alaska is one of the important copper-producing districts belonging to the United States. It seems probable that the mineral output of Alaska will continue to be large and valuable; by 1923 it had amounted to more than fifty times the price the United States paid for the territory.

Salmon Fisheries. The catching and canning of fish is the most valuable industry of the territory. Of all the salmon fisheries none equals in importance those on the coast of Alaska. The number of cans annually packed in the 135 canneries is enormous, reaching nearly 250,000,000 (Fig. 90).

Seal Fisheries. Fur seals have the habit of returning from the deep sea, season after season, and remaining for a time

Brown Bros.

FIG. 164. Fur seals in great numbers on the breeding grounds on Pribilof Islands, Bering Sea.

on precisely the same breeding grounds. The principal breeding grounds of the North Pacific are the Pribilof Islands situated in the Bering Sea and belonging to Alaska (Fig. 164). This collection of seals once numbered 4,000,000 or more, but reckless killing threatened to exterminate it. Then, in 1911, the four governments most concerned, Russia, Japan, Great Britain, and the United States, succeeded in forming a treaty by which the

killing of the seals, except under close restrictions, was forbidden for at least fifteen years. The herd is again rapidly increasing in numbers. Our government, under the terms of the treaty, permits the killing of a limited number of the males each year, and their skins are sold at the annual fur sales in St. Louis.

The Reindeer. — Years ago, the United States government placed a herd of reindeer in Alaska and left it in charge of the natives, under government control. The reindeer have prospered wonderfully and have multiplied far beyond all expectations (216,000 in 1922). They supply meat, milk, and skins and may be used as draft animals. Some of the meat is being sent to our western states, where it commands a high price. This experiment with the reindeer promises great success, for the animals are thriving excellently in the Alaskan environment.

Transportation. — Most of Alaska is without roads, railroads, or navigable rivers. The Yukon is the largest river, and it is used for steam navigation. The total railroad mileage is less than 1000. One line of considerable length is the government railroad from Seward on the coast northward to Fairbanks on the Tanana River, a branch of the Yukon. It is expected that this road will aid in "opening up" Alaska, but its success is yet problematic.

Conclusion. — Alaska has paid for itself a hundred times over. Its great wealth for the future lies in its minerals and its fisheries, and perhaps in its herds of reindeer. Agriculture in Alaska is not attractive, and promises little, at least for many years to come. People will go to a land such as Alaska if the prospect of gaining wealth is alluring, as it was during the gold rush to the Klondike and to Nome, but few will stay for the ordinary occupations of life; the climate of the interior is too rigorous.

Exercise

It is suggested that different members of the class prepare special reports on (1) Alaska, (2) the Hawaiian Islands, (3) the Philippine Islands. Possibly some person who has traveled or resided in one of these places can be persuaded to give a talk before the class.

CHAPTER XIV

CANADA

Canada of the Twentieth Century. — Canada, our big northern neighbor, is one of the large countries of the world, and a country of great possibilities. It may be true that nearly six sevenths of its area is a wilderness, yet there is still left an area, much larger than any European country except Russia, that offers farms and homes to millions of additional settlers; for there is enough agricultural land to make at least ten states as large as Ohio.

The Dominion of Canada has nine provinces. Named from east to west, they are: Nova Scotia, New Brunswick, Prince Edward Island, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia. The country includes also Yukon Territory and the North West Territories (Figs. 165, 174). The island of Newfoundland, which also controls the Atlantic

FIG. 165. Comparative population of the provinces of Canada.

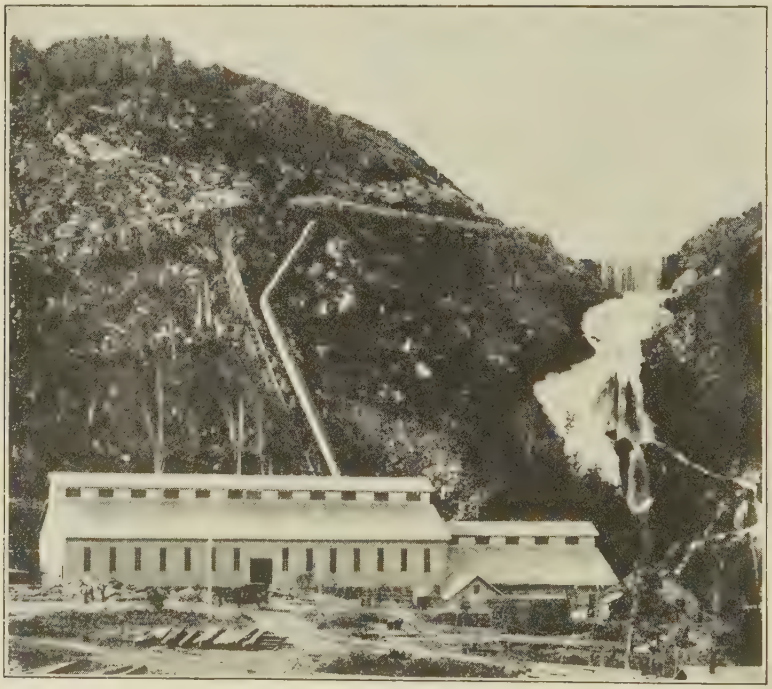
coast of Labrador, has its own government separate from that of Canada. Excepting the French-speaking inhabitants of Quebec, most of the Canadian people are of British descent. A good many American farmers have gone into the agricultural lands of western Canada, and a still greater number of Canadians have come to the United States. The total population of the Dominion is about 9,000,000, which is less than one tenth that of the United States, and three fifths that of Mexico. The Canadians are an energetic, forward-looking people, differing little from the British element in the population of the United States; they have faith in the future of their country and are developing it with energy and intelligence.

Advantages and Disadvantages in Location. — The greater part of Canada is far to the north, in the land of long, white winters. More than half of it is too near the Arctic to be attractive, and will probably remain largely unoccupied for a long time to come. However, Canada occupies an excellent commercial position, for it faces Europe on the east and the Orient on the west, and joins the United States along a 3000-mile boundary on the south. Few countries possess a more advantageous situation for the ocean commerce of the future, but that advantage is partly offset by the nature of the coast, and by the location of the mountain ranges near both coasts. There is no coastal plain on the west; the bold, lofty ranges of the western mountains rise from the very shore of the Pacific and interpose a mountain barrier about 400 miles wide between the ocean and the agricultural lands of the interior. On the east, the desolate plateau of Labrador makes it almost impossible to enter the continent north of the St. Lawrence. Much of the eastern region lying between the St. Lawrence and the United States boundary is rough, not fertile, and thinly populated. Only by the valley corridor of the St. Lawrence may Canada be readily entered from the east, and that corridor is closed by ice to navigation about four months of every year.

Canada has a commercial advantage in her nearness to the United States, with which more than half of her foreign commerce

is carried on. Two thirds of Canada's imports are purchased in the United States, and nearly half of her exports go to the United States. The two countries are in somewhat different stages of development, especially in respect to manufacturing; each needs the products of the other, and this has given rise to an ever-increasing volume of trade across the border. Close friendship exists between the two countries, and the future prosperity of both countries lies in the preservation of close and cordial relations.

The Great Wealth of Forests. — Three northern countries in the world have valuable forests: they are the United States,



Brown Bros.

FIG. 166. One of the many wood-pulp mills in southern and eastern Canada. Water power is almost invariably used in such mills. Canada is now one of the world's chief sources of paper pulp.

Canada, and Russia. The northern half of Canada, with its cold winters and short summers, produces few of the large, straight trees from which lumber is cut. But in the southern half there are stretches of land extending hundreds of miles, covered with forests — some excellent, some fair, some poor, but in the total representing an enormous amount of forest wealth. On the whole the Canadian forests are less valuable acre for acre than those of the United States, but they have not yet been so largely cut over, and so retain a larger proportion of their original timber. Great damage has been done by forest fires; and from the agricultural lands of southern Canada the forests were wastefully cleared, as they were in the United States. Great areas of forests remote from centers of population have scarcely been touched, and contain large reserves of lumber and pulp wood. The rapid cutting of our own northern forests is making the paper mills of the United States more and more dependent upon Canada for pulp wood, the chief source of paper. Spruce, the best of all the woods for paper pulp, is the principal forest product of Canada. The forests of Douglas fir and cedar, which are the pride of Oregon and Washington, are no less the pride of British Columbia. The provinces of Ontario and Quebec are Canada's chief sources of forest products, partly because they have the larger part of the population, and partly because their products can be exported easily to the United States, to which two thirds of them are sent.

The Farms and their Products

Location of the Improved and Productive Lands. — Canada has two large regions of fertile, nearly level land. One lies in southern Ontario and Quebec north of New York and Ohio, and in climate and soil is similar to those states. This is the most populous part of Canada; it includes the largest cities, has a network of railways, and contains the principal manufacturing centers; it is the heart of the nation (Fig. 174). The other fertile region is the southern part of the three prairie provinces — Manitoba, Saskatchewan, and Alberta (Fig. 174). These two

farming regions of Canada are separated by a stretch of several hundred miles of swamps, bare rocks, and scrubby timber. However, this intervening, non-agricultural land includes two of the richest mining regions of Canada.

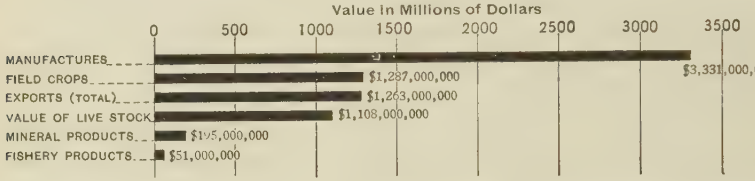


FIG. 167. Annual value of exports, value of live stock, and annual value of products of Canada. (Average for a 5-year period.)

The province of Prince Edward Island in the Gulf of St. Lawrence is small, but it is one of the garden spots of Canada. The two maritime provinces — New Brunswick and Nova Scotia — are a continuation of the rocky, hilly, wooded lands of northern New England, poorly suited to agriculture and rather thinly populated. Only a very small portion of the great province of Quebec has land that is of much value for farming. On the Pacific coast, British Columbia is mountainous, yet has some fertile valleys. All the land in Canada that is now producing cultivated crops would make up an area about twice the size of Ohio. Canada may be thought of as one of the great food-producing regions of the future, capable of supporting five or ten times as many people as it now has.

Farm Products. —*The cereal crops.* The prairie provinces — Manitoba, Saskatchewan, and Alberta — with their wide sweep of nearly level land, are the granary of the Dominion, and one of the chief spring-wheat regions of the world. These lands are a northward extension of our own wheat lands in Minnesota and North Dakota. The growing season is short, but the summer days are long and the crops mature rapidly. However, this region sometimes suffers from disastrous droughts which ruin the crops over thousands of square miles in the north and west. Canada has produced as much as 400,000,000 bushels of wheat

Keystone

FIG. 168. A threshing machine at work in a Saskatchewan wheat field.

in a year,[1] but the average is less than this. Here, as in all new lands which are continuously sown to wheat, the yield per acre is declining.

The annual production of oats is nearly double that of wheat, but corn is unimportant, and barley, rye, potatoes, flax, and miscellaneous crops are grown in Canada as they are in northern United States and Europe.

Fruit. Three sections of Canada make a specialty of growing fruit, particularly apples (Fig. 169): (1) the Annapolis Valley of Nova Scotia; (2) southern Ontario, just north of Lake Erie, often referred to as the Niagara Peninsula; and (3) certain irrigated valleys in British Columbia. Apples have long been a valuable part of the exports of Canada, particularly the exports from Nova Scotia.

Dairy products. The moist climate and clay-loam soils of southern Ontario and Quebec make this the best dairying region of the Dominion. Canada has some 3000 to 4000 cheese factories and butter factories, and makes a specialty of the exportation of cheese, mainly to the British Isles. Moreover, millions of

[1] The greatest production reached in the United States is a little over 1,000,000,000 bushels.

Ewing Galloway

FIG. 169. A Canadian apple orchard in bloom.

unused acres in Canada are adapted to grazing and eventually will be so employed.

The Exportation of Farm Products. — Up to the time of the World War, Canada was distinctly an agricultural country, and still is largely so. Although manufacturing grew rapidly after 1915, the interests of a majority of the people are still in agriculture. Owing to the large area of farm land and the small population (9,000,000), Canada produces far more foodstuffs than her own people consume, and these are exported largely to the United States and the British Isles. However, the country has one drawback with respect to grain exports, namely, the location of the principal cereal lands far back in the interior of the country, 2000 miles from the open Atlantic. A railroad is being built from the Wheat Belt to Hudson Bay for the purpose of shortening the railroad haul; but Hudson Bay is closed by ice the greater part of the year, and it does not seem probable that this railroad can ever be of much use. A great deal of wheat is taken by rail to Fort William and Port Arthur on

Lake Superior, whence it is shipped eastward by lake and rail and is finally exported through Montreal, New York, and other Atlantic ports.

Fisheries and Furs

Canadian Fisheries. — The principal fishing banks off the coast of North America are near Newfoundland, Nova Scotia, and New England (Fig. 91). Cod, herring, mackerel, halibut, haddock, smelt, hake, and pollack are caught in the offshore waters and on the "banks," while large quantities of lobsters and clams are taken near shore. For example, 50,000,000 pounds of lobsters have been caught in a year; as many as 10,000 men with a million lobster traps have at times been engaged in this

Paul Yates

Fig. 170. Drying fish near Digby, on the coast of Nova Scotia.

particular type of fishing. The magnitude of the Canadian sea fisheries may be judged from the fact that 150,000,000 pounds of cod and 250,000,000 pounds of herring are caught in a single year; but the salmon of the Pacific coast have a larger money value than any other kind of fish caught in Canada. Great canneries have been established in British Columbia, as they have been in Oregon, Washington, and Alaska. The actual value of the fish caught in all Canadian waters is not, after all, a great sum; it about equals the value of the eggs sold by Canadian farmers and poultry keepers; yet the fishing industry attracts far more attention than the poultry industry.

Furs and Fur Farming. — Soft, warm furs are nature's covering for many of the animals of the North. The richness and warmth of fur garments have made them coveted by mankind, and in this period of luxuries, furs have become an important item of international commerce. Canada is one of the leading countries of the world in the production of furs. For more than 250 years the Hudson's Bay Company has dominated this industry in northern Canada, and it still owns millions of acres of land, has more than a hundred factories or fur-collecting stations scattered over northern and central Canada (Fig. 174), and has a dozen or more mercantile establishments in Canadian cities; it is said to be the oldest chartered trading company in existence. Throughout a large part of Canada this company and others have hunters and trappers — mainly Indians — engaged in capturing fur-bearing animals such as the beaver, bear, fox, ermine, lynx, marten, skunk, seal, wolf, raccoon, and muskrat.

The high price of certain furs has led to the industry of *fur farming*, most fully developed in Prince Edward Island. The most valuable fur-bearing animals — chiefly the silver black fox — are reared in inclosures, are carefully tended, and are either sold in pairs for breeding purposes, or their pelts are sold for furs. Choice animals have, in rare instances, sold for as much as $35,000 a pair; the finest pelts in certain instances have brought as high as $2000 each, but these are extreme prices, many times higher than the average. There are more than

200 such farms or ranches in this single island, and a smaller number in various other provinces, and also in the United States. Interesting as this industry is, the value of its products is a relatively small item in the world's industries.

Mineral Resources and Industries

Coal. — There are three important coal areas in Canada: (1) in Nova Scotia, which until recently was the leading coal producer among the Canadian provinces; (2) in Saskatchewan and Alberta, where there are extensive beds of varying grades of

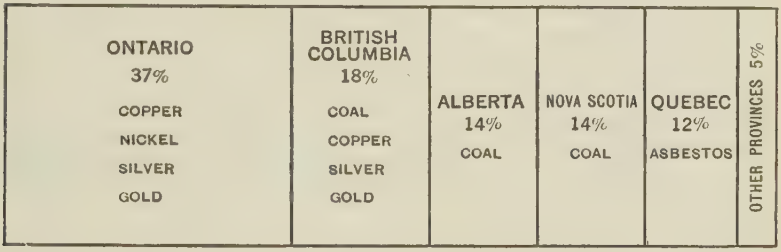


Fig. 171. Approximate percentage of Canadian minerals produced in various provinces; a three-year average.

coal, which now supply more than any other coal area in Canada; (3) in British Columbia (Fig. 171).

The coal of Nova Scotia is of high quality and is mined close to the sea; it can be conveniently shipped by water up the St. Lawrence to Quebec and Montreal and to other ports of eastern Canada, and cargoes are sometimes sent to New England ports.

Nova Scotia and Saskatchewan are separated by nearly 2000 miles of territory which contains no coal, and this intervening region includes the most densely populated and most highly developed manufacturing section of all Canada. This is a great drawback, or would be if coal from the United States were not readily obtainable. In fact, Canada usually imports from the United States more coal than is mined in Canada, and most of this goes to the province of Ontario.

The coal fields of Alberta are of great extent; the coal varies

from lignite or brown coal to a good grade of bituminous, and in the mountains even approaches the quality of anthracite.

British Columbia has large coal deposits of good grade; some of these are on the coast of Vancouver Island, and coal is exported to our Pacific Coast states which are poorly supplied with coal of their own.

Taking Canada as a whole, it has large coal reserves, and these will play an important part in the future growth of Canadian industries. The two unfavorable conditions are: (1) the generally low grade of the greater part of the coal, and (2) the entire absence of coal beds in the east central part of the Dominion, the part in which the greatest number of people live.

Petroleum. — Down to 1923, very little petroleum had been found in Canada, but reports of extensive oil fields in the far north have been received. Considering its great extent of country, it will be surprising if important oil deposits are not found in Canada.

Iron. — Newfoundland — which is a British colony not included in the Dominion of Canada — has large reserves of iron ore of moderate quality, but Canada proper, so far as known, has very little. This makes Canada dependent upon outside sources for the most important of the metals.

Nickel and Copper. — The mines of Sudbury, in Ontario, produce about two thirds of all the nickel used in the world. This is one of the few metals not found in the United States. Canada is producing copper in increasing quantities; its output is already greater than that of any European country, though it is only a small fraction of that of the United States.

Silver and Gold. — One of the greatest silver camps in the world is at Cobalt, in Ontario. The mines there have recently yielded as much silver annually as all South America yields. Canada is now the third silver-producing country of the world. Formerly the gold mines of the Klondike, near the Alaskan boundary, were famous, but their output fell off quickly. Canada's gold production is about one fourth that of the United States.

Keystone

FIG. 172. In the Klondike and elsewhere, gold is frequently separated from the gravel by a washing process — sometimes in pans operated by the miners, sometimes by powerful streams of water as shown in this Klondike scene.

Other Minerals. — Canada has a long list of lesser minerals, including lead, zinc, natural gas, salt, and asbestos. The asbestos quarries of Quebec are the most important known, and provide fully three fourths of the world's supply. Only a minor part of Canada's vast area has been explored for minerals, and the present known deposits are only a small fraction of the deposits that probably will be found.

MANUFACTURING

Recent Rise of Manufacturing in Canada. — Canada has developed much more slowly than the United States, and it

is still primarily an agricultural country. Prior to 1914 manufacturing made slow progress, but under the stress of the World War (1914–1918) a tremendous advance was made. Formerly Canada's exports consisted almost entirely of raw materials, products of farm and forest. At the end of the World War Canada's exports of manufactured goods exceeded her agricultural exports. In the banner year of 1920, the value of manufactures equalled nearly $500 per capita, or only $100 less than the corresponding figure for the United States, the foremost of manufacturing nations. It is an interesting fact that the yearly value of the manufactures of Canada is about equal to that of the state of New Jersey. The principal manufacturing centers are Montreal, Toronto, Hamilton, Winnipeg, Vancouver, and Quebec. In manufacturing, as in nearly all other activities, Ontario is the leading province. A great many American manufacturers have factories in Canada, and a great deal of American capital is invested there.

Canadian manufactures are exceedingly varied, but the most prominent ones are those which utilize the products of the country's farms, forests, and mines. The five groups of manufactures which stand highest in the list are: (1) flour and grist mill products, (2) slaughtering and meat-packing products, (3) lumber and timber, (4) wood pulp and paper, (5) butter and cheese.

Transportation

The Great Lakes and St. Lawrence Waterway. — Canada shares with the United States the use of the most important inland waterway in the world — the Great Lakes (Chap. X). A Canadian canal has been built around the rapids of the St. Marys River (the Soo), connecting Lake Superior and Lake Huron. Many years ago Canada built the Welland Canal, connecting Lake Erie and Lake Ontario, and has recently enlarged and deepened it. Several short canals also were built around the various rapids in the St. Lawrence River. By means of these improvements, vessels drawing approximately fourteen

feet of water are able to pass from any port on the Great Lakes to Montreal, to Quebec, or out to the Atlantic. Great quantities of wheat from the prairie provinces are shipped by rail to Fort William and Port Arthur on Lake Superior, as already mentioned, and thence are taken eastward by lake vessels sometimes to ports on Georgian Bay and sometimes farther east.

FIG. 173. The canals of eastern Canada and New York.

The St. Lawrence River is the open gateway into Canada from the Atlantic, and has played a very important part in the economic life of the country. Ocean vessels of large size ascend the river to Montreal, the principal port of Canada. If improvements on the river that are now under consideration should be carried out, ocean vessels of good size will be able to enter the Great Lakes by way of the St. Lawrence.

The Great Railway Systems of Canada. — The oldest and most important of the railway systems of Canada is the Canadian Pacific, terminating at Vancouver on the Pacific, and on the

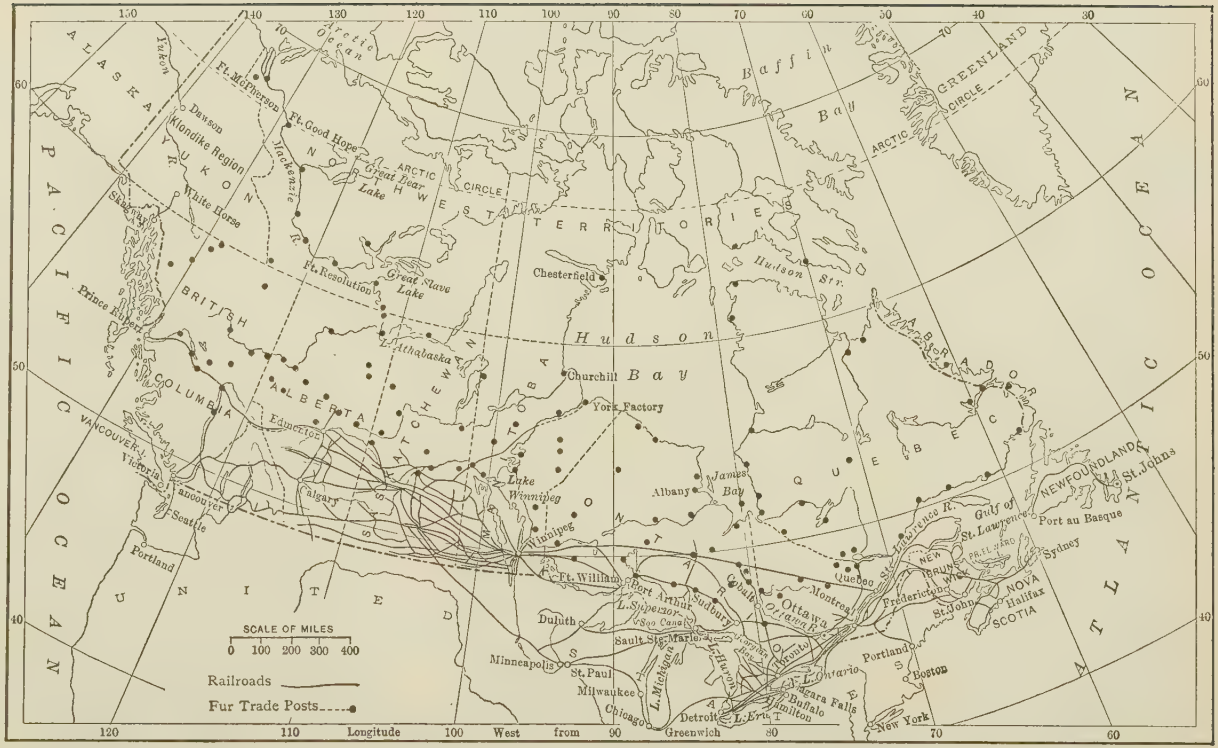


FIG. 174. Railroads and fur-trade posts of Canada.

Atlantic side at Montreal and Quebec in the summer, and at St. John and Halifax in the winter. This is one of the leading railway systems of the world. In the west it serves that part of Canada lying nearest the United States, and owns or controls certain lines in the United States, reaching St. Paul, Minneapolis, and Chicago; and in its eastern section it passes through the state of Maine.

The Grand Trunk, the Grand Trunk Pacific, the Canadian Northern, and a few lesser lines have been consolidated into a single system owned by the Canadian government and known as the Canadian National Railways. This system has Pacific terminals at Prince Rupert and Vancouver, and eastern terminals at various points, including a winter terminal at Portland, Maine. The Grand Trunk also reaches several American cities, including Chicago and Detroit. The majority of the lines of the Canadian National Railways are farther north, and serve regions that are less developed than those served by the Canadian Pacific.

All the railway lines between east and west pass through the city of Winnipeg, making it one of the greatest railway centers of Canada. Southern Ontario and the wheat belt of the prairie provinces are well supplied with railways, but the northern part of Canada has none at all.

Cities of Canada

Montreal is the largest city, chief manufacturing center, and chief seaport of Canada; it is on the St. Lawrence, at the head of navigation for large ocean ships. Montreal is about the size of Pittsburgh.

Toronto, about the size of Buffalo, is on Lake Ontario, and is the second manufacturing city of Canada.

Winnipeg, in Manitoba, occupies a place in Canada comparable to that of Chicago in the United States. It is the focus of all the western railroads, is one of the great wheat markets of North America, and is the principal distributing center of western Canada.

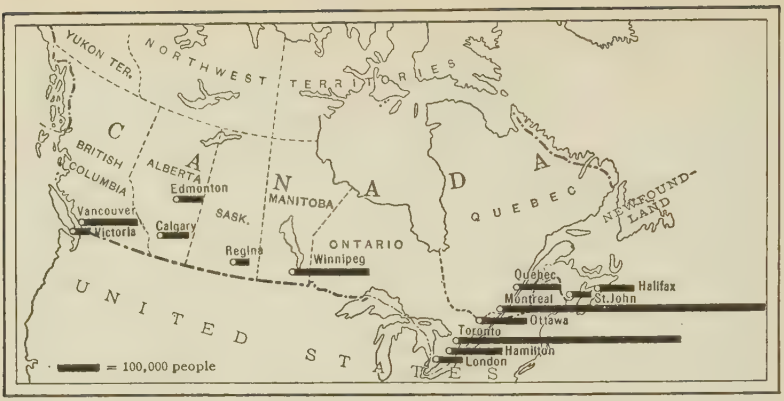


FIG. 175. Population of the leading Canadian cities.

Vancouver is the only large Canadian city on the Pacific coast, and is the chief port for the Pacific trade of Canada.

Hamilton, in Ontario, is a rapidly growing manufacturing city already well past the hundred-thousand mark.

Ottawa, the seat of government of the Dominion, is on the Ottawa River, not far from Montreal.

Quebec, for two centuries the guardian fortress of the St. Lawrence, is still referred to as the Gibraltar of America, although its famous old fortress is dismantled. It is an interesting old city, but is not growing rapidly.

Halifax is smaller than several other Canadian cities not mentioned in this list, but its position on the extreme eastern coast of Canada gives it considerable importance as a railroad terminus and as a base for the British navy.

SUMMARY

1. Canada is a country of great size and great possibilities, but as yet unevenly developed.

2. The commercial possibilities, which in so large a country ought to be enormous, are, however, limited by the rigorous climate that prevails throughout the greater part of the country.

3. Canada is one of the three countries of the world having exceedingly large forest resources, and these are especially important to the United States as a source of pulp for paper.

4. Canada is still primarily an agricultural country. Southern Ontario and the southern part of the prairie provinces contain the chief present and future farm lands of the Dominion.

5. The prairie provinces are a part of the great spring-wheat belt of North America, and form one of the important sources of export wheat of the world.

6. Canada is known to have large mineral wealth — including coal — but it is altogether probable that a great part of the mineral wealth is yet to be discovered. Unfortunately, there are no coal deposits in Ontario, the principal province.

7. The World War gave a great stimulus to manufacturing in Canada, and the country became an exporter of manufactures as well as an importer.

8. The St. Lawrence Valley is the eastern gateway of Canada. Together with the Great Lakes, the St. Lawrence River is a commercial route of much value to Canada. Some of the Canadian railroads are owned by the government, and others by the Canadian Pacific system.

9. The fisheries and fur industries of Canada are important in various ways, but the money value involved is not great.

10. More than half the foreign trade of Canada is with the United States. Very close and cordial relations exist between the two countries.

Exercise

1. How do Canada and the United States compare in area? (Table 1, pages 583, 584.)

2. On the map, Figure 174, locate each of the following provinces: Nova Scotia, New Brunswick, Prince Edward Island, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia.

3. On the same map, locate the following cities: Montreal, Quebec, Ottawa, St. John, Toronto, Halifax, Hamilton, Winnipeg, Calgary, Edmonton, Vancouver, Victoria, Fort William, Port Arthur, and Prince Rupert.

4. Also locate Newfoundland, Labrador, Gulf of St. Lawrence, St. Lawrence River, Ottawa River, Hudson Bay, Niagara Falls, Georgian Bay, the Soo, the Klondike, the Mackenzie River.

5. Canada has less than one twelfth as many people as the United States. Suggest several reasons for this fact.

6. Why are the St. Lawrence River and Valley of much importance to Canada?

7. Where are the coal areas of Canada? Show wherein the location of these coal areas is (1) favorable, and (2) unfavorable to Canada.

8. Where are the two leading agricultural regions of Canada? Where is the great wheat region?

9. Why has southern Ontario become the most populous and the best-developed part of Canada?

10. Where are the three principal fruit belts of Canada? What is the chief fruit grown in these belts?

11. Why is Canada's geographical position favorable for foreign commerce?

12. Why might a country like Canada be expected to have a very large value of exports in proportion to the population?

13. Why does the greater part of the wood pulp and paper of Canada go to the United States?

14. Why does only a small part of the dairy products go to the United States?

15. What mineral products does Canada produce in large quantities? One of these is not produced in the United States: what is it?

16. Where are the two important mining camps — Sudbury and Cobalt? What minerals are mined there?

17. Show how the shortage of iron and the absence of coal in central Canada is a drawback to manufacturing there.

18. Discuss (1) the fisheries; (2) the fur production of Canada.

19. Is the nearness of Canada to a manufacturing nation like the United States an advantage or a disadvantage to manufacturing in Canada? Explain.

20. With what two countries does Canada carry on the greater part of its foreign trade? Give reasons.

21. Why is Canada to be regarded as a country of great future possibilities?

CHAPTER XV

MEXICO AND THE LANDS AROUND THE CARIBBEAN SEA

Mexico

The Past. — A little over four hundred years ago a small army of Spaniards under their leader, Cortez, landed on the coast of what is now Mexico; they found it peopled by tribes of Indians, including the Aztecs, who had the highest civilization possessed by any of the North American natives. The Spaniards crushed the Aztecs and other Indians into submission and ruled Mexico with an iron hand for three hundred years, during which time they took a vast quantity of gold and silver from the country. A little more than a century ago the people rose in revolt, and after a long war established an independent government, but it has had a stormy experience of misrule and revolutions.

The People. — Besides the Aztecs there were many other tribes of Indians in Mexico, and there are still no less than forty or fifty tribes, speaking different languages or dialects. The vast majority of the Mexican people are Indians and *mestizos* (Indian and white mixed). The white people are mainly of Spanish descent, and Spanish is the official language. In the past this small minority owned most of the land and constituted the educated upper class. However, one president of Mexico was an Indian; and Diaz, the strongest president Mexico ever had, was part Indian. At least four fifths of the people are illiterate. The educated class includes people of marked refinement, often wealthy and socially charming; but the Mexican nation as a whole seems poorly qualified to support a republican form of government.

Fig. 176. Market day in a Mexican town. Markets and market days are more important in Latin America than in the United States.

Physical Features and Climate. — Mexico has over fifteen times the area of a state like New York, and about 15,000,000 people. Next to Brazil, it is the most populous of the Latin-American countries.[1] The mountainous plateau that forms the greater part of the country is partly desert, partly semi-desert, and partly agricultural land. The city of Mexico is over 7000 feet above sea level and has a delightfully mild climate throughout the year. Only the coastal lowlands and the desert are oppressively hot. In the country as a whole, rainfall is deficient, though it is heavy along much of the eastern coast and sufficient for crops in the southern third of the country. The mountainous edges of the plateau rise sharply near both coasts and make it difficult to build railroads to the interior.

[1] Latin America includes nearly all the countries in America south of the United States; they number twenty republics.

Agriculture. — Agriculture is the principal occupation of the Mexican people. The country has as much land suited to some form of agriculture as any European country except Russia, yet only a small fraction of this is used efficiently. There are

Fig. 177. Feeding sugar cane leaves to cattle on a ranch in Mexico.

grazing lands of wide extent suited to cattle, sheep, and goats, but frequent revolutions with their bandit gangs make stock raising unprofitable, at least in many places. Corn and beans form the chief food of the working class (the *peons*), and wheat nearly sufficient for the country's needs is grown. Most of the other products of the warm temperate and tropical zones are raised; these include coffee, sugar, cotton, and tobacco, but Mexico is not a leading producer of any of them. The outstanding agricultural export is the fiber of the henequen plant, grown on plantations in the peninsula of Yucatan. The long, tough fibers (called sisal) are obtained from the fleshy leaves of the plant (Fig. 61). Most of the sisal is sent to the United States, where it is made into binder twine for use in tying the bundles of grain cut and bound by reapers (Fig. 27).

Minerals. — Mexico is distinctively a mining country and has been such since the days of the Spanish conquest. Fabulous sums of gold and silver were taken from the mines of Mexico during the 300 years of Spanish control. Gold is no longer an important product of Mexico, but the country is one of the two leading producers of silver, the output sometimes exceeding that of the United States and sometimes falling below it. Much copper and lead are produced, but almost no iron or coal, although large deposits of iron ore exist in the country. The lack of good coal is unfortunate, for it is needed in the carrying on of many industries. Since about 1910 Mexico has risen to the position of one of the leading producers of petroleum, — second only to the United States. One of the most remarkable oil fields ever discovered is near the east coast of Mexico, not far from the city of Tampico. The wells are of the gusher type and many of them have yielded or are capable of yielding tens of thousands of barrels daily. The greater part of this oil is produced by companies financed in the United States and to a lesser extent in England. Most of the oil is shipped to the United States for refining, or is used for fuel oil, especially in oil-burning steamships, which are rapidly increasing. The

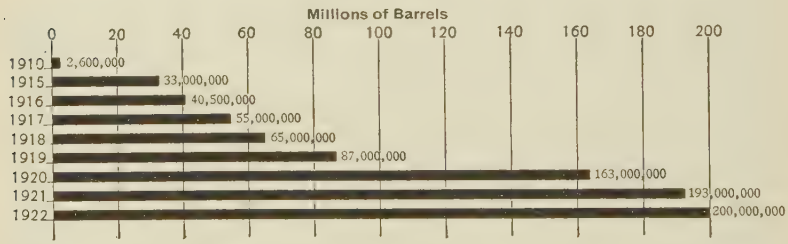


Fig. 178. Graph showing the rapid increase in the production of petroleum in Mexico.

place of minerals in the export trade of Mexico is seen in the fact that they have an average annual value almost double that of all other exports combined.

Transportation. — Mexico's long coast line on two oceans is favorable to commerce, but the harbors on the eastern side are poor; those on the west coast are better. The mountain ranges interfere with the construction of railroads between the coast and the plateau, and successful lines are few. Four railways extend to the United States, and the region around Mexico city — the most densely populated section — is well supplied with railways. These roads were built mostly with foreign capital, but the main lines are now owned by the Mexican government. There are no large rivers and no waterways of any importance, and good roads are scarcely known.

Commerce. — The United States, the most populous country near Mexico, controls nearly three quarters of the foreign trade of that country. Petroleum, minerals, sisal, cotton, and coffee are the chief products that Mexico has to sell, while she buys mainly manufactured goods, railway cars and locomotives, and coal. Mexico with its great area and population has less to sell abroad than the island of Cuba with only a fifth as many people.

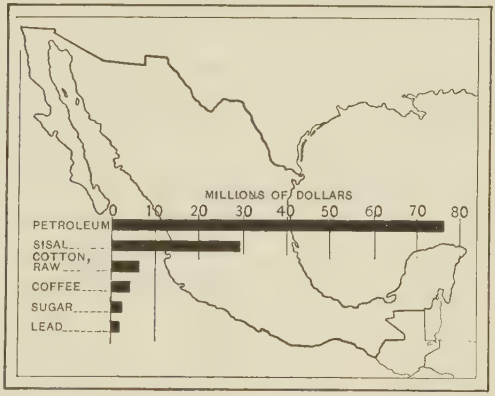


FIG. 179. Value of the chief exports from Mexico to the United States in 1921.

Summary. — Mexico is chiefly a plateau, with scanty rainfall over a large area, yet it has considerable possibilities for agriculture and stock raising; it has very great mineral wealth, a favorable geographical position, and abundance of labor, though the laborers, chiefly Indians and mestizos, are inefficient. It is especially important as a producer of petroleum, silver, and sisal. It lacks capital and businesslike methods. Citizens of the United States have large interests in Mexican industry and trade.

Central America

General Description. — The name Central America is applied to the region lying between Mexico and South America. In this small area are six little republics — Panama, Costa Rica, Salvador, Nicaragua, Honduras, and Guatemala. In addition, there is the colony of British Honduras (Fig. 189). None of these countries is larger than a medium-sized state like Alabama. The mountain system which forms the backbone of Central America is nearer the Pacific coast than the Atlantic, but the population is mostly on the Pacific slope and at moderate mountain altitudes where cooler temperatures prevail. The principal lowlands are on the eastern side. Here the rainfall is very heavy, the forests are of the tropical jungle type, and the temperature is usually sweltering. Few people lived on the eastern slope and in the lowlands until the cultivation of bananas became important, less than a generation ago.

Political and Economic Conditions. — Attempts at forming a union of the Central American countries into a single federated nation have been made, but without success. Most of the people, as in Mexico, are Indians and mestizos. Revolutions and attempted revolutions have been frequent, and the financial condition of most of the little republics is not good, though it is apparently improving. Costa Rica and Panama are better off than the other countries. Panama, being closely related to the United States because of the latter's ownership of the Panama Canal and its control of the Canal Zone, is in good financial condition and occupies an advantageous commercial position.

The only crop of importance on the Pacific coast of Central America is coffee, grown in the highlands, and this constitutes the principal export. Some stock raising and a little mining are carried on.

One can cross both Guatemala and Costa Rica from coast to coast by railroad, and each of the other countries has one or more short railroads, but as a whole Central America is very

poorly supplied with means of inland transportation. The increase of banana plantations on the Caribbean side is gradually extending the railroads in the banana-growing sections. Better steamship service between Central America and the United States has followed the opening of the Panama Canal, and the greater part of the trade of the Central American countries is with the United States.

Bananas in the Caribbean Region. — A generation or two ago, bananas were a rarity in most parts of the United States. Now they are as common as apples, and sometimes are less expensive. They are a highly nutritious fruit, and in their home lands provide a leading article of food. The abundance and cheapness of bananas in the United States are largely due to the efficient methods by which they are produced and marketed by American fruit companies which operate in the Caribbean region. On the eastern shore of Central America, on the north shore of Colombia, in Jamaica, and to a smaller extent on other islands, banana plantations of great extent have been developed. This industry, which has grown to large proportions, has been built up by United States capital and enterprise. The principal fruit company has many plantations, owns scores of steamships, employs thousands of people, and handles millions of bunches of bananas each year.

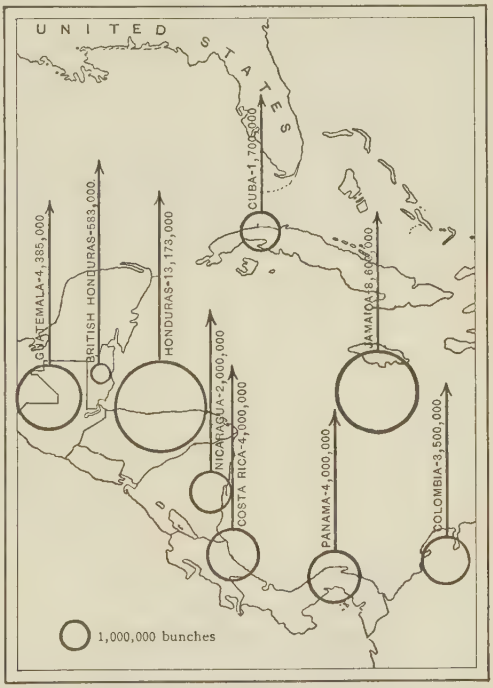


FIG. 180. Shipment of bananas from the Caribbean region to the United States in one year.

On the plantations, the banana plants are grown in rows like trees in an orchard. Each plant bears one bunch of fruit. After this has been removed, the plant is cut down and new ones spring up from the same root. Scores and even hundreds of miles of railroad track traverse the large plantations, and these railway lines all converge at some well-chosen harbor where ocean vessels can load. A ship carries from 20,000 to 60,000 bunches in her hold, which is kept at an even temperature by circulating air.

The fruit is always shipped while green. At most of the important docks, rapid machinery is used for loading and unloading the fruit (Fig. 3). Everything is done on a large scale and by efficient methods, and thus the fruit is produced and marketed at a surprisingly low cost, yet with profit to the fruit company. The banana trade gives to the Caribbean region better steamship service than it could otherwise support, and this benefits all forms of commerce in this part of the world.

The Panama Canal. — The Panama Canal was constructed by the United States in 1904–1914. French companies had previously attempted to dig a canal there and had failed. The United States purchased the French interests in Panama for $40,000,000 and by an additional outlay of over $350,000,000 completed and fortified the canal. It is 50 miles from deep water on the Pacific side to deep water on the Atlantic side. The greater part of the canal is about 80 feet above sea level, with the necessary locks at each end (Fig. 182). Ships with a cargo pay a toll of $1.20 per net registered ton for using the canal; this amounts to from $3000 to $8000 a trip for moderate-sized vessels. The use of the canal increased very rapidly after

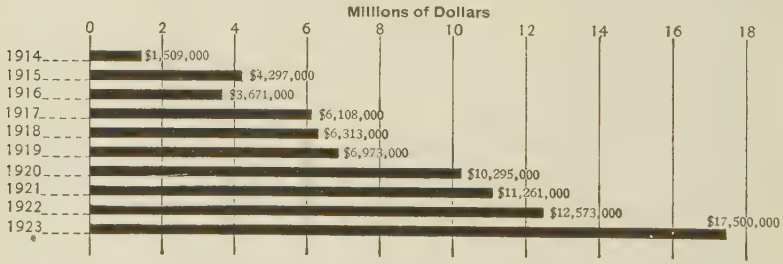


FIG. 181. Tolls collected at the Panama Canal by fiscal years. Tolls for the calendar year 1923 exceeded $20,000,000.

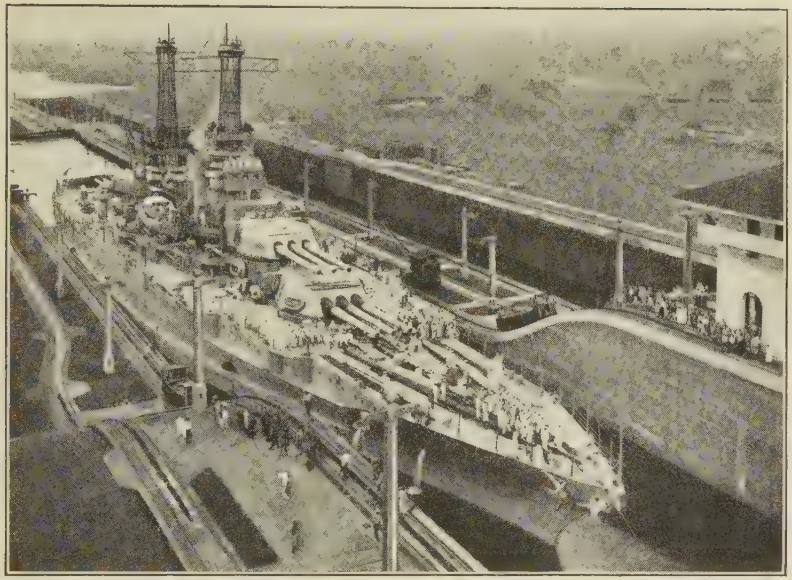


FIG. 182. The United States battleship *New Mexico* passing through the Gatun locks in the Panama Canal. Vessels are towed into the locks, stopped there, and towed out, by electric locomotives on tracks beside the canal.

the World War, and if the same rate of increase continues, the traffic through the Panama Canal will soon exceed that through the Suez Canal. Figure 181 shows how rapidly the tolls increased after the World War.

Everything in the Canal Zone is under the control of the United States government. There are about 10,000 employees engaged in operating and maintaining the canal, handling freight at the terminals, operating the Panama Railroad, repairing vessels, building and repairing the homes of these thousands of employees, and carrying on many other activities. About fifteen ships a day pass through the canal, the majority of them being American and British. The canal is of tremendous importance. Through it naval vessels can be quickly shifted from the Atlantic to the Pacific or back again. The ocean journey from our eastern ports to the west coast of South America is greatly shortened, and heavy commodities can be shipped at a considerable saving between our Pacific and Atlantic states. Some

of the distances saved by using the canal (instead of going around South America) are shown in the following table:

	Distance saved
Between Liverpool and San Francisco	5666 miles
Between New York and Honolulu	6610 miles
Between New York and Valparaiso, Chile	3747 miles
Between New York and Shanghai, China	1876 miles
Between New Orleans and Yokohama, Japan	5705 miles

The West Indies

The group of islands southeast of Florida still carries the name given it by the Spanish discoverers, who thought they had reached the Indies near Asia. There are four large islands and many smaller ones. Once all belonged to Spain; then one after another passed under the control of some other country or became independent, and now Spain owns none of them. All except a part of the Bahama Islands are in the tropics, as a rule have ample rainfall, and are highly productive when well

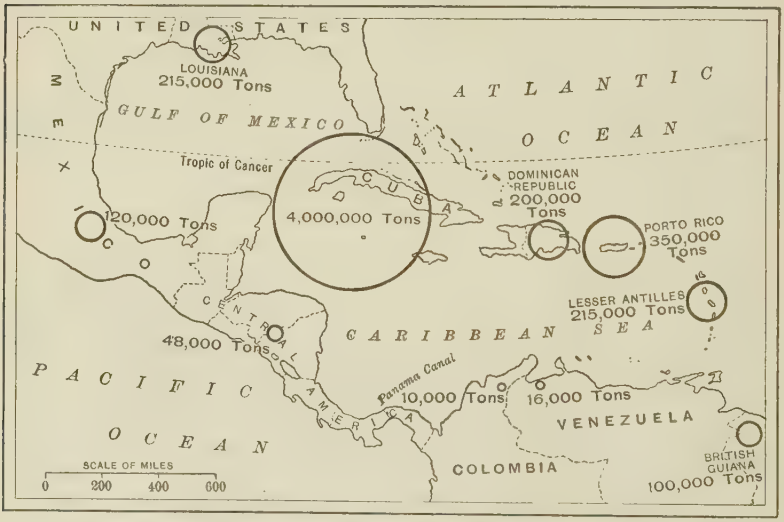


Fig. 183. Sugar production in 1922–23. (*Willett & Gray's estimates.*)

cultivated. They are peopled mainly (except Cuba and Porto Rico) by persons of negro blood whose ancestors were long ago brought into the islands as African slaves. Cuba and Porto Rico are credited with 70 to 75 per cent of white people, and all of the islands have a percentage of whites.

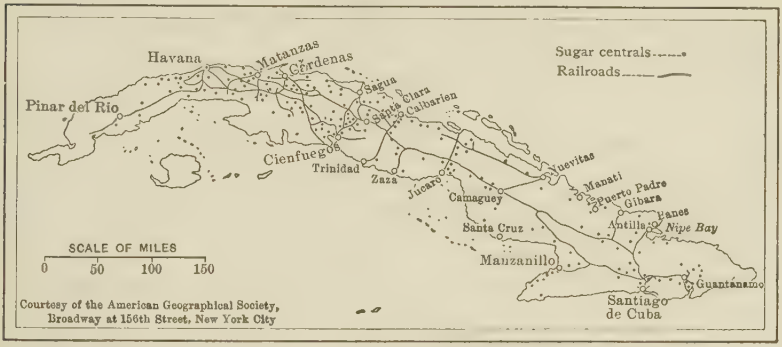


FIG. 184. Railroads, sugar-exporting ports, and sugar centrals in Cuba.

Cuba. — Cuba, with the military aid of the United States, became an independent republic in 1898. The United States, by treaty, still has limited rights of control in Cuba, but exercises them only when necessary for the welfare of Cuba. The island is over 800 miles long, is as large as a state like New York, and has well toward 3,000,000 people. The chief city — Havana — is a modern, bustling city of 360,000 people.

The one outstanding crop is sugar cane; a traveler through Cuba sees miles and miles of cane, and here and there the great modern sugar mills. The cane is cut by hand and hauled by ox-carts or railroads to the mills, where it is crushed between steel rollers which press out the sweet sap. By boiling, the water in the sap is driven off and the sugar crystallized. Cuba has about 200 of these great mills, or *centrals*, as they are called. While it is the leading producer of cane sugar in the world, only a minor part of the land of the island is devoted to sugar or to any other cultivated crop. Many of the largest estates and their huge sugar mills are owned by people of the United

States. Cuba occupies an ideal geographical position at the front door of the United States, which is the largest user of sugar. The soil of Cuba is very fertile; there are many good harbors; and labor is fairly abundant, though insufficient in the sugar-harvesting season.

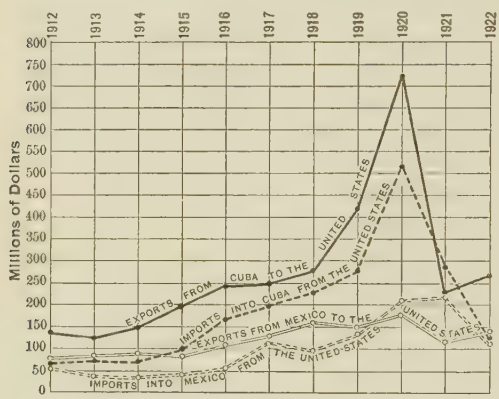


FIG. 185. Value of the trade of the United States with Cuba and with Mexico.

Tobacco is the other distinctive crop of Cuba, but its value is far below that of sugar. The best tobacco is raised in the region west of Havana, and has a higher reputation for cigar making than any other tobacco.

So great is the value of the sugar exported from Cuba, and so great is the consequent buying power of the island, that it has a per capita foreign trade among the very largest in the world.

Porto Rico. — Porto Rico was ceded to the United States by Spain in 1898; in 1917 United States citizenship was conferred upon the people. It is smaller than Connecticut, but has a population nearly as great. More than two thirds of the people are classed as white, and the remainder are negroes or mulattoes. Illiteracy was widespread but is rapidly diminishing as a result of the present greatly increased number of schools. Sugar is Porto Rico's chief crop, and makes over half of the exports. Just as in Cuba, the growth of the sugar industry in Porto Rico has been very rapid since the island came under American control. The value of the sugar exported from this little island in 1920 was greater than that of all the gold mined in the western hemisphere in that year. Tobacco is the crop second in importance, with a value from a quarter to a third that of sugar. Coffee ranks

third. Coffee is the only large export from Porto Rico that does not go mainly to the United States. Various kinds of fruit are raised, and considerable quantities are exported, although the value reaches only a few millions of dollars a year.

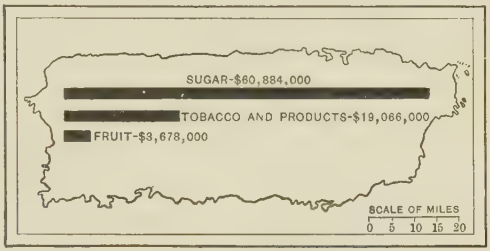


FIG. 186. Average annual value of exports from Porto Rico to the United States.

The commerce of Porto Rico has grown enormously under American rule, rising from $17,000,000 to $247,000,000 during a period of twenty years. The little island is one of the most populous and most productive areas, in proportion to size, in all tropical America.

Haiti. — The island of Haiti is occupied by two negro republics — Haiti and the Dominican Republic. Both are very backward and are making exceedingly slow progress. The governments are so bad that outsiders are little disposed to invest capital in the island, and the residents have practically no capital of their own to invest. Most of the people carry on some crude form of agriculture, and the island exports limited quantities of sugar, coffee, tobacco, and cacao. The last-named product comes from the seeds of a fruit-pod that grows on the cacao tree. It is the basis of chocolate and cocoa.

Jamaica. — Jamaica, with five times as many colored people as whites, is a British possession. It is one of the largest producers of bananas among the Caribbean lands, and most of the crop is sent to the United States.

Lesser Antilles. — East of Porto Rico are the three small *Virgin Islands* acquired by the United States in 1917. They have only 32,000 people, produce next to nothing, and were purchased mainly because of their possible value as a naval base.

The other islands of the Lesser Antilles belong to Great Brit-

ain, France, and the Netherlands. They yield sugar and other tropical products but are less valuable commercially than they once were. *Trinidad* (British) has an asphalt lake which gradually fills from below as the asphalt is removed from the surface. Trinidad is also an important source of cacao.

The Bahama Islands (British), off the east coast of Florida, have few people and no important industries.

The Northern Countries of South America

The Guianas. — Guiana is divided into three unimportant tropical colonies belonging respectively, like the Lesser Antilles not far away, to Great Britain, the Netherlands, and France. The population is small, and is badly mixed, including a few whites. A small part of the area near the coast is cultivated, the main crops being sugar, coffee, rice, and cacao. There are immense tropical forests, almost untouched, and gold mines in all three of the colonies.

Fig. 187. Sugar-producing regions of South America. (*Pan-American Union.*)

Venezuela. — Venezuela is larger than France and the British Isles combined. It is a backward republic with a mixed population; only a small fraction of the

people are white. Revolutions and misgovernment have greatly retarded the progress of the country, and present conditions are by no means favorable, though they are improving. The valley of the Orinoco is a vast grassy plain known as the *llanos*. About half of the country is occupied by mountains largely covered with tropical forests, parts of which are unexplored. The elevated northern coastal strip is given over mainly to coffee plantations, of which there are said to be 30,000, large and small. Coffee is by far the leading product and export, though cacao is also important. Sugar, once important, has declined, as it has in nearly all Caribbean lands except Cuba and Porto Rico. Venezuela has pasture lands capable of maintaining great herds of cattle, but the grazing industry is indifferently carried on.

There is considerable mineral wealth, including gold and asphalt. The majority of the people are not fond of work under a tropical sun. As in all Latin American countries, there is an upper class of educated and refined families. There are very few roads other than mule paths, and no railroad system, though there are several detached lines of different gauges. The largest city, Caracas, has from 75,000 to 100,000 population. The foreign trade is small, and is chiefly with the United States. Manufacturing by modern methods scarcely exists in Venezuela.

Colombia. — Colombia is twice the size of France and has a population of about 6,000,000, the greater part of whom are Indians, negroes, and mixed races. The whites are well educated people of ability, who own most of the property and occupy most of the better governmental positions. Bogota (150,000), the capital, is the chief center of culture in the whole northern part of the continent. In the past, revolutions have been frequent; the country is sadly lacking in roads and railroads; manufacturing has made little headway; and agriculture is rather primitive. Coffee is the principal product and export; in fact, it contributes from 60 to 75 per cent of the value of all exports. The country was a large producer of gold and silver in the Spanish days, and its mineral wealth is undoubtedly large. Gold, platinum, and emeralds are the leading mineral products,

FIG. 188. Coffee is the chief crop and chief export of Colombia; much of it is transported on the backs of donkeys and mules because of the lack of wagon roads and railroads.

and petroleum is believed to exist there in important quantities. Colombia is the leading gold producer of South America, but all South America yields less gold than California. Platinum, which is much more valuable than gold, is nearly all obtained from two countries — Russia and Colombia. Prior to the World War, Russia was much the larger producer. Most of the emeralds of commerce come from Colombia.

The capital city and the larger part of the population are far inland on the high plateaus, where altitude offsets the tropical latitude and gives an enjoyable climate. Traveling is slow and difficult because railroads are few. The Magdalena River is the principal route for shipping products into and out of the country, and passengers require from seven to ten days to

get from the Caribbean coast to Bogota by river and rail. The commerce of such a country is necessarily small, for the greater part of the people have few wants; progress is retarded by the lack of education, of roads, of adequate railroads, of capital, and of government revenues with which to improve conditions. The beneficial effect of good government and of the free investment of capital in the industries of a country is impressively shown in the case of Cuba, whose foreign trade is greater than that of Mexico, the six Central American countries, Haiti, the Dominican Republic, Venezuela, and Colombia all combined; and the commerce of tiny Porto Rico is greater than that of all Central America.

Problems

1. Why is coffee produced mainly on the Pacific slope of Central America and bananas on the Caribbean slope? In what parts of the United States would you expect most of the bananas to be sold? Is prompt and rapid shipment more necessary in the case of coffee or in that of bananas? Why?

2. The United States consumes about 55,000,000 bunches of bananas a year. If each bunch averages 100 salable bananas, and if the United States has about 110,000,000 people, how many bananas a year — on an average — does each person in the United States eat?

3. Why do not the Mexican people develop the oil fields of their country instead of leaving this enterprise to outsiders? Why do not the people of Central America enter the banana business on a large scale as people of the United States have done? In general, why are nearly all the large business enterprises of the Caribbean region in the hands of foreigners?

4. Why is Cuba's geographical position especially favorable for the production of sugar? Why has the production of sugar in Cuba grown more rapidly since 1898 than before? The people of the United States consume about 90 pounds of sugar per capita each year. Taking the population as 110,000,000, how many pounds are required annually? From what other islands do we import large quantities of sugar?

5. What European nations possess islands in the West Indies? What country owns (*a*) Jamaica? (*b*) Porto Rico? (*c*) Trinidad? What two islands are independent? About how long is Cuba? (Use scale of miles, Fig. 189.) About how far is it from the southern end of Florida to Cuba?

FIG. 189. Mexico and the lands around the Caribbean Sea.

6. In what way is the high altitude of central Mexico an advantage and in what way a disadvantage? Why is it better that the petroleum of Mexico is on the east coast than it would be if it were on the west coast? Why would you expect a country like Mexico to have mineral wealth?

7. Why is the United States vitally interested in Mexico? In the West Indies? In the whole Caribbean region?

Exercise

On the map (Fig. 189) locate each of the following:

Vera Cruz	Porto Rico	Magdalena River
Colombia	Caribbean Sea	British Honduras
Mexico	Gulf of Mexico	Orinoco River
Cuba	Panama	Lesser Antilles
Salvador	Bogota	Principal oil fields
Jamaica	Honduras	Henequen-producing region
Mexico city	Venezuela	Chief coffee lands
Havana	Costa Rica	Bahama Islands
Haiti	Caracas	Strait of Florida
Yucatan	Guatemala	Nicaragua
Trinidad	Panama Canal	Dominican Republic

CHAPTER XVI

THE COUNTRIES OF WESTERN SOUTH AMERICA

Slow Development. — After four hundred years of occupation by Europeans and their descendants, why are the West Coast countries of South America (excepting Chile) so little developed? Why so few schools, so few roads, so few railroads, and so few cities? Why so little immigration, so little manufacturing, and so little capital for investment?

It is believed by some that there are actually fewer people in Peru and Bolivia than there were when the Europeans first came, centuries ago. The immigrants seeking homes in all the West Coast countries of South America in ten years do not equal the number that enter New York harbor in a few months. The railroad mileage in all the West Coast countries between Panama and Cape Horn does not equal that in Illinois or Pennsylvania; and as much commerce ordinarily passes through New York harbor in a month as passes through all the harbors of western South America in a year. The reasons for this state of affairs are to be found chiefly in the topography and climate of these countries.

The Andes Barrier. — The Andes form the longest continuous mountain barrier in the world; it is nearly 5000 miles in length, and in parts has three massive ranges. Only a narrow strip of lowland lies between the sea and the mountains, and nearly all the passes across the main range are higher than the tops of the loftiest peaks in the United States. Only one railroad completely crosses the Andes, and that one crosses well to the south where the mountains are lower. From Colombia to northern Chile, most of the people live on the plateaus and in the mountain valleys in order to escape the tropical heat and the diseases of the lowlands; but on these high, mountainous lands agriculture

Fig. 190. Acres of pelicans on an island off the coast of Peru. The rookeries furnish large quantities of guano, used for fertilizer. From the dry islands near Peru, guano worth hundreds of millions of dollars has been sold.

is handicapped and crops are scanty; transportation is difficult and is carried on chiefly by llamas or donkeys, a slow and expensive method. Under these conditions only very rich mineral deposits can be worked at a profit, and many deposits lie untouched because they are scores or perhaps hundreds of miles from a railroad.

Coast Line. — The coast line of western South America is very regular. There are few indentations of any size except in southern Chile (Fig. 191). From middle Chile to Panama there is only one large bay, the Gulf of Guayaquil, on the coast of Ecuador, and this region was long dreaded for its diseases, though it has recently been much improved. All the harbors in this stretch of 3000 miles are poor; yet this condition is far less important in retarding the countries than is the Andes barrier.

80°
70°
60°
50°
40°
10°
0°
20°
CENTRAL AMERICA
Caribbean Sea
Gulf of Panama
Colon
Panama Canal
Panama
Gulf of Darien
Cartagena
Barranquilla
R. Magdalena
Gulf of Venezuela
Maracaibo
L. Maracaibo
Valencia
Barquisimeto
Barcelona
Merida
Cucuta
Orinoco R.
Ciudad Bolivar
CURAÇAO (Dutch)
Puerto Cabello
La Guaira
Caracas
Part of Spain
TRINIDAD (British)
Georgetown
Paramaribo
Cayenne
VENEZUELA
GUIANA
DUTCH
FRENCH
BRITISH
Medellin
Vol. Tolima
Buenaventura
Cali
Bogota
COLOMBIA
Popayan
Sierra Pacaraima
Tumac Humac Mts.
Mouths of the Amazon R.
Quito
Vol. Cotopaxi
Vol. Chimborazo
ECUADOR
Guayaquil
Gulf of Guayaquil
Cuenca
EQUATOR
Rio Negro
MARAJO I.
Para (Belem)
Maranhao
Manaos
Amazon River
Santarem
Iquitos
Tabatinga
Pt. Parina
Paita
Trujillo
Mt. Huascaran
Ceara
C. St. Roque
Parahiba
Pernambuco (Recife)
Maceio
PERU
Lima
Callao
Cuzco
Acre
BRAZIL
Bahia (São Salvador)
L. Titicaca
Vol. Misti
Arequipa
Mt. Sorata
La Paz
Mt. Illimani
Trinidad
Matto Grosso
Cuyaba
Plateau of Matto Grosso
Goyaz
Mollendo
Oruro
Plateau
Cochabamba
Santa Cruz
Sucre
Potosi
BOLIVIA
Arica
Iquique
Diamantina
Serra do Espinhaco
Serra dos Aymores
Madeira R.
Falls of the Madeira
Tapajoz
Xingu
Tocantins
Parnahiba
Araguay
Guapore
Jurua
Purus
Javari
Yapura
Yapo
Maranon
Ucayali
Huallaga
Mayo
Meta
Casiquiare
Sa Parima
Caura
Mauduro
Bucaramanga
Sao Francisco
PACIFIC OCEAN
ATLANTIC OCEAN

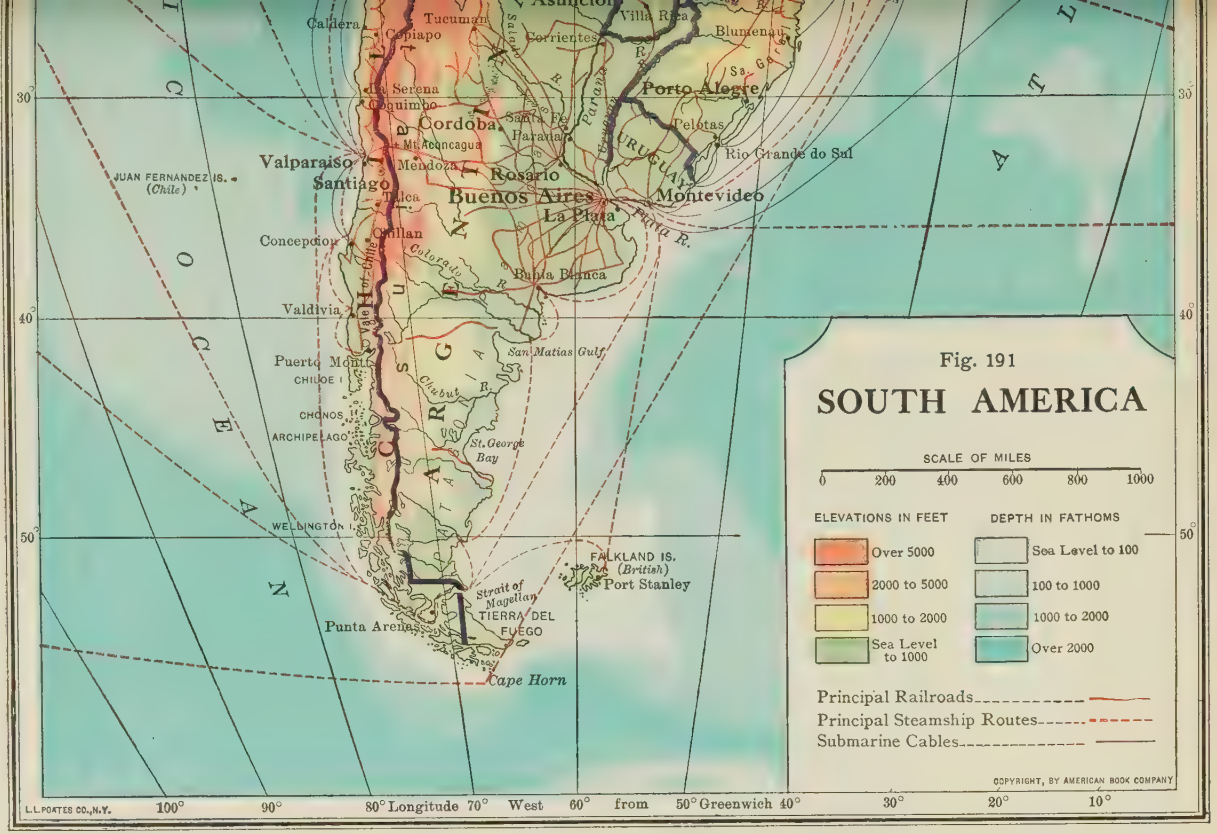


Fig. 191

SOUTH AMERICA

SCALE OF MILES

0 200 400 600 800 1000

ELEVATIONS IN FEET

- Over 5000
- 2000 to 5000
- 1000 to 2000
- Sea Level to 1000

DEPTH IN FATHOMS

- Sea Level to 100
- 100 to 1000
- 1000 to 2000
- Over 2000

Principal Railroads

Principal Steamship Routes

Submarine Cables

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Difficulties of Inland Transportation. — The towering Andes, rising so near the ocean, make it costly to build railroads into the interior. A few lines wind and tunnel and bridge their crooked ways up to the plateau, but the cost of maintaining and operating these roads is very high, and this makes it necessary to charge high freight and passenger rates, which in turn greatly limit the usefulness of the railroads. It is difficult to secure money for building railroads under such conditions. All the countries north of Chile make some use of the rivers of the Amazon system for sending products out to the Atlantic, but this traffic has amounted to very little since the great falling off in rubber production which came after 1915.

In all this region wagon roads are practically unknown; mule paths and llama trails wind their way here and there among the mountains, and Indians carry loads on their backs like beasts of burden. The sure-footed but slow-moving llama, the "camel of the Andes," carries a load of 50 to 75 pounds. The difficulties of transporting goods in these Andean countries is and must always be one of the great obstacles in the way of progress.

Other Difficulties. — All of the West Coast countries of South America, north of Chile, are within the tropics, and only a small percentage of their people are unmixed whites. Indians and mestizos form the majority of the population, estimated at 90 per cent or more. Nearly all the Indians and most of the mestizos are illiterate and unambitious, producing little and having few wants. Only the whites — mainly descendants of old Spanish families — and a few others are educated or own much property. The governments, while growing better, are still inefficient and unstable, and revolutions have been frequent. Capital for developing mines, building railroads, or making other costly improvements is insufficient and must be supplied mainly by foreigners if supplied at all. There is considerable wealth in the hands of the upper class, but it is quite largely in land.

The entire coast of Peru and about one third of Chile (north) are almost rainless. Nothing is grown in this part of Chile, and crops on the coast of Peru require irrigation.

Chile, however, lies mostly in the temperate zone, a large part of its people are white, and the country is more progressive and prosperous than its neighbors.

Mineral Wealth. — Spain took billions of dollars' worth of gold and silver from the Andes in the colonial days when the mining was done by the forced labor of the Indians. The gold and silver now produced in the Andes are of small importance, but

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FIG. 192. A great copper mining and smelting plant in northern Chile.

Peru and Chile are active producers of copper from a few rich deposits worked mostly by United States corporations (Fig. 192). Bolivia is the second greatest tin-producing region of the world, and Peru has oil fields of considerable present value and of still larger promise for the future. There are reasons for believing that several of the West Coast countries may become important producers of oil.

Nitrate. In northern Chile are found the world's greatest known deposits of *nitrate of soda;* they are near the surface of

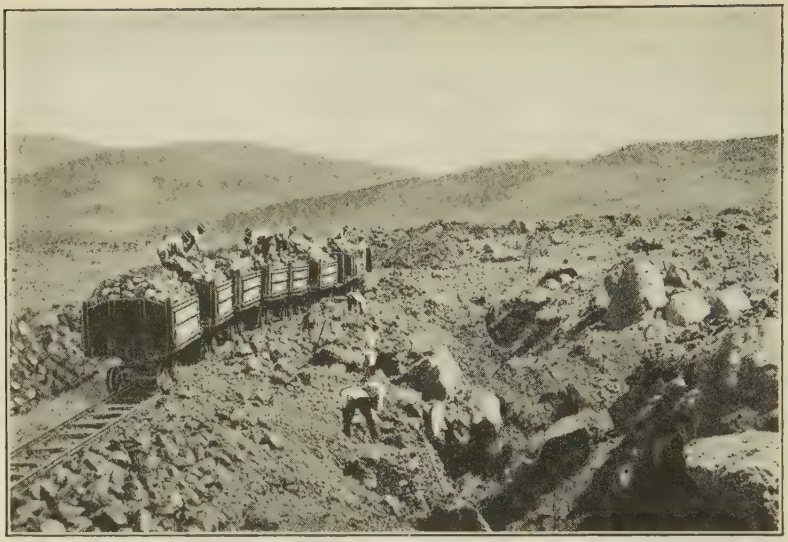

FIG. 193. Loading cars with nitrate of soda in the desert of northern Chile. Nitrate is the chief export of Chile.

the ground in the desert (Fig. 193). After being dug out and put through a process of dissolving, refining, crystallizing, and drying, in extensive plants, the nitrate is taken to Pacific ports and shipped to the United States and Europe. The method of origin of the nitrate deposits is not positively known, but their preservation is due to the almost absolutely desert conditions. If any considerable amount of rain fell, this salt would long since have been dissolved and carried away. The nitrate is used mainly as a fertilizer, for nitrogen is one of the essential plant foods; but it also has a special value as a very important constituent of explosives. The United States and the Allies imported millions of tons of it during the World War, mostly by way of the Panama Canal. Chile has the distinction of being the only country that has deposits of nitrate of any importance, and the value of the nitrate exported annually reaches $40,000,000 to $50,000,000. Its value is about equal to that of all the other minerals mined in the Andes. The export duty which Chile

collects on the nitrate shipped out of the country pays a considerable part of the expenses of the government.

Other minerals. Chile also has valuable iron deposits, and is the only country in South America that mines coal to any extent. Coal is mined in Colombia and Peru for the use of the mines and some of the railroads, but Chile has a little for export. Practically all of the copper and much of the tin and other metals mined in western South America go to the United States by way of the Panama Canal.

FIG. 194. Approximate annual value of the chief mineral products of South America.

Cacao Production in Ecuador. — Cacao beans, from which chocolate and cocoa are made, have become one of the important commodities of commerce. The United States alone imports from 300,000,000 to 400,000,000 pounds each year. Most of the world's supply comes from two parts of the world; either from the west coast of Africa and near-by islands, or from tropical America. Several countries and islands bordering on the Caribbean produce considerable quantities of the beans, but Brazil and Ecuador are larger producers. The cacao beans are the seeds from a fruit as large as a short cucumber, which grows from the trunk and large branches of the cacao tree (Fig. 355). In Ecuador the trees

are grown chiefly on plantations, which may contain 30,000 or 40,000 trees. The fruit is so heavy that it must be grown in localities that are well sheltered from the wind. The seeds — the size of almond meats — are dried and cured near the plantations, most of which are around the Gulf of Guayaquil. Many of the largest plantations are owned by foreign companies.

Panama Hats; Ivory Nuts. — Ecuador is also the principal source of Panama hats, which are made by the Indians, and of ivory nuts, which are the large, solid seeds of a species of palm. Ivory nuts are exported to the United States to the amount of 30,000,000 to 50,000,000 pounds a year; they are used chiefly for making buttons.

Irrigated Plantations on the Coast of Peru. — Most of the people of Peru live in the highlands, where they produce scarcely enough food for their own simple needs; but along a part of the coast is a narrow strip of level lowland. Here sugar and cotton plantations, covering in all over 300,000 acres, are maintained by irrigation from the mountain streams, for without irrigation the coastal region is a desert. From these plantations — partly owned by foreign capital — are exported cotton and sugar in

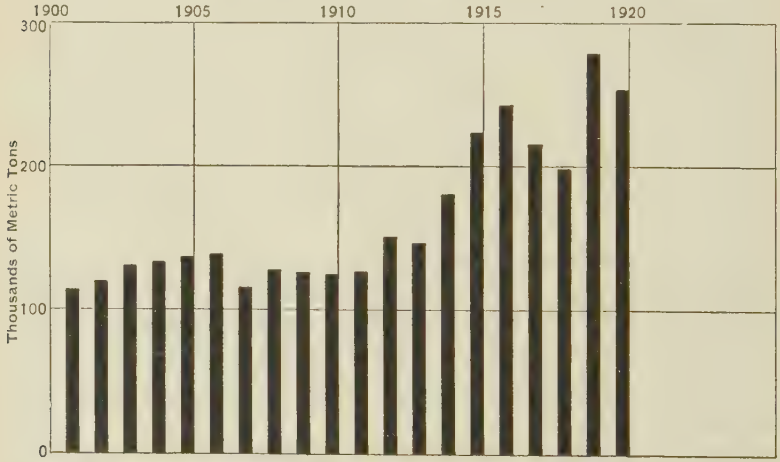

Fig. 195. Sugar exports from Peru.

considerable quantities. These irrigated spots are about the only lands in Peru that yield crops of any large amount for export.

Pastoral Industries of the Andes. — Nearly all inhabited mountain lands raise goats, sheep, or other grazing animals; in many instances this is about the only use to which these rugged regions can be put. Wool from the sheep, llama, and alpaca is produced in excess of the needs of the sparse population of the Andean highlands; it forms one of their few exports, although the total value of the wool exported from these mountains falls far below that exported from the little country of Uruguay.

FIG. 196. Cotton-producing regions of South America. (*Pan-American Union.*)

Progressive Chile. — Argentina, Brazil, and Chile are the most influential countries of South America, and are sometimes spoken of as the "A. B. C. countries" from the first letters of their respective names. Chile is nearly 3000 miles long, and has an average width of less than 100 miles. Mountainous as it is, it has more agricultural land than Japan, but scarcely one fifteenth as many people. The larger part lies in the temperate zone, and the people are alert and energetic. The "Vale of Chile," as

the central valley is called, is productive, delightful in climate, well supplied with railroads, and has an increasing amount of manufacturing. The great mineral wealth (nitrate, copper, iron, and coal) has already been referred to (pages 309–311). The country has an army and a navy of considerable strength, probably the best in South America, and it is very proud of them. As in all Latin America, the land of Chile is held in large estates, and the wealth is mostly in the hands of a small minority of the people who govern the country. The foreign trade of Chile is equal to that of all the other West Coast countries together; the exports are largely mineral products, and the imports are mainly manufactured goods.

Commerce with the United States. — The opening of the Panama Canal and the changes brought about by the World War increased the commerce of western South America with the United States. Formerly this trade was largely with Europe, but now the United States has more of it than any other country. Our total trade with the West Coast is not large when compared with our trade with Canada or even with Cuba, and it is less than one tenth of our trade with the British Isles; yet we are selling these countries upwards of $100,000,000 worth of American goods yearly, and we are buying an even larger amount of their products. However, the mountainous nature of the countries and the large proportion of Indians in the population retard the economic development of the region.

Cities. — There are no great cities in the Andean countries, with the single exception of Santiago, the capital of Chile, which is about the size of Buffalo. Valparaiso, the chief port of Chile, handles the greater part of the foreign trade of the country, except that to and from the nitrate fields.

La Paz, the capital of Bolivia, situated 12,000 feet above sea level, has about 100,000 people.

Lima, the capital and chief city of Peru, seven miles inland, was founded a hundred years before Boston, and is one of the pleasantest residence cities on the west side of the continent. Callao is the port of Lima and the chief port of Peru.

Quito, the capital of Ecuador, is very near the equator, but on account of its elevation (over 8000 feet) it has a temperate climate; its port is Guayaquil, on the gulf of the same name, already referred to (pages 305, 312).

In nearly all South American countries the capital is the leading city and the largest city.

Exercise

1. In what ways have the Andes Mountains retarded the progress of the west coast of South America?
2. In what ways have the Andes been of benefit to these countries?
3. What is true, in general, regarding the character of the harbors of western South America?
4. Ecuador produces for export only three things worth mentioning. What is the chief one? What are the others?
5. About what proportion of the people of Colombia, Ecuador, Peru, and Bolivia are white? What is meant by "mestizo"?
6. Why are there few railroads in all the West Coast countries north of Chile? Why are there more in Chile?
7. What two minerals did the Spaniards take in large amounts from western South America? Are these minerals now being extensively mined in this region?
8. Only four or five minerals are now mined in large amounts in the Andean countries; what are they and from what country or countries does each come?
9. Give reasons for the backwardness of agriculture in most of the West Coast countries.
10. Why are the exports from these countries rather small in value?
11. Give two reasons for the increase in the trade between the United States and the West Coast countries since 1914.
12. In what ways is Bolivia handicapped in carrying on trade with other nations?
13. What is the great export from Chile? For what is the product used?
14. Where is the "Vale of Chile"? In what ways does it differ from other parts of Chile?
15. How does Chile rank in importance among the West Coast countries? Why does Chile hold this rank?

16. Which of the following items would you expect the West Coast to import in considerable quantities? Give your reason in each case.

agricultural machinery	wool	silk goods
mining machinery	fur coats	cotton goods
automobiles	overalls	office furniture
sewing machines	phonographs	lumber
cash registers	coal	raw cotton

17. Has any West Coast country as large a population as the city of New York? (See tables at the end of this book.)

18. Why do the majority of the people of the West Coast buy few imported goods?

19. What changes among these people are necessary if they are to become larger buyers of imported goods?

CHAPTER XVII

THE COUNTRIES OF EASTERN SOUTH AMERICA

Argentina

The Country. — Argentina is one of the promising young countries of the world. Substantially all of it lies in the temperate zone, and this is one of the reasons why it is making rapid progress. It is a large country, about a third the size of Brazil or the United States. It is a country of vast plains, the only mountains being along the western boundary, or spurs projecting from those mountains. An area much larger than France, lying in the eastern part of the country, is known as the *pampa;* this is almost as level as a floor, and over large areas there is scarcely a tree to be seen except those planted by some settler. The pampa is the heart of Argentina; it contains most of the cities and fully 80 per cent of the people. The soil of the pampa is deep and fertile, and it produces more than two thirds of the crops and live stock of Argentina. In the extreme north the country reaches into the tropics. The southern third (Patagonia) is dry, and toward the south is bleak in winter, and is used for little else than pasturing great flocks of sheep.

Cattle and Sheep. — Down to about 1900, Argentina was distinctly a stock-raising country. Millions upon millions of cattle and sheep grazed on the rich grass of the pampa, and still do, although more and more of the land is coming under the plow. The number of sheep has declined notably since 1895, but Argentina still has about as many sheep as the United States, and nearly half as many cattle. By bringing in from Europe and the United States the best modern breeds of sheep and cattle, and crossing them with the native animals, the live stock of the country has been greatly improved. For example, by introducing certain thoroughbred sheep from England, the average

FIG. 197. Distribution of cattle in South America. Each dot represents 10,000 head. Dashes indicate regions for which definite data are not available. (*Pan-American Union.*)

weight of a fleece of Argentine wool has been doubled. This means that without any increase in the number of sheep, or any increase in the area of land required for pasturage, the amount of wool has been doubled. The best breeds of foreign beef cattle and dairy cattle have been introduced, greatly to the benefit of the cattle industry. Years ago, cattle were slaughtered merely for their hides, most of the meat being thrown away. This was before the day of the refrigerator ship, and there was then no way of sending fresh meat to Europe, where it might have found a market. Now, there are in Argentina a dozen or more meat-packing establishments which ship chilled and frozen meat in refrigerator ships to Europe and even to the United States.

FIG. 198. Distribution of sheep in South America. Each dot represents 50,000 head. (*Pan-American Union.*)

Dairying has grown into a large industry, and the making of butter and cheese has become one of the leading manufacturing industries of the country. Argentina is still one of the great stock-raising countries of the world, and easily the foremost in South America, for there are large areas of land that receive light rainfall and are therefore not suited to agriculture.

Conditions Favorable and Unfavorable to Agriculture. — The level topography, rich soil, and mild temperature of the pampa are ideal for crops, but the rainfall is somewhat uncertain; in the extreme east it is usually sufficient for crops, though not always. Western and southern Argentina, in the lee of the Andes, is too dry for crops without irrigation, and very little farming is done there. Around the southern and western margin of the pampa is an area where crops fail every few years because of drought; in fact, much of Argentina suffers from occasional droughts. For example, in 1914 the corn crop was over 8,000,000 tons; two years later the crop from nearly the same amount of land was only 1,500,000 tons, a falling off of over 80 per cent. This was due to dry weather and to the destruction wrought by millions of locusts that swarmed over the country from the north and ate almost every growing plant in their path. This happens every few years and is one of the most serious pests that the farmers of Argentina have to combat. Almost every country has something to contend with, and in Argentina and Uruguay it is drought and locusts.

Fig. 199. Wheat-producing regions. (*U. S. Dept. Agr.*)

Importance of Agriculture. — In proportion to its population, Argentina is about the greatest food-exporting country in the world. While the amount produced is scarcely a quarter of that grown in the United States, the population of the country is less than one tenth that of the United States. Agriculture and stock raising must always be the dominant industries of Argentina.

The Leading Crops. — There are five great crops: corn, wheat, oats, flax, and alfalfa; about two thirds of the plowed land is

devoted to these. Argentina is one of the wheat granaries of the world, and wheat is the leading agricultural export; much of it is ground into flour before going abroad. There are millions of acres of flax, which is raised for the seed. Practically all of the oats and alfalfa and much of the corn are fed to live stock, though a great deal of corn is exported, some of it even coming to the United States, the leading corn-producing country of the world. Near Mendoza in western Argentina is an irrigated region devoted to grape raising and wine making; and near Tucuman, in the north central section, is an important sugar-producing region where nearly all of the sugar used in the country is made.

FIG. 200. Flax-producing regions. (*U. S. Dept. Agr.*)

The Great Estates. — The land of Argentina is largely held in great estates, often reaching to hundreds of thousands of acres, and some to a million acres or more. At one time the government sold public land at the rate of a square league of 6600 acres for $400. Until recently there have been relatively few farms of the small size that we are accustomed to in the United States. A large part of the cultivated land is rented to tenant farmers who take care of 100 to 500 acres each. The majority of them live in mud or sod huts with few of the comforts of life. But modern farming machinery is widely used, for the level country is ideally suited to it.

The Quebracho Forests. — In northern Argentina are extensive forests, whose most valuable tree is the *quebracho*. The wood is exceedingly hard and resistant to decay, and on this account it is used for railroad ties. But a more important use of

the wood is for supplying tanning extract, or *tannin*. Many kinds of wood, bark, and nuts contain tannin, used in tanning hides, and quebracho is one of the chief sources. In some cases the wood itself is exported, but more commonly the tannin is extracted from the wood and is shipped in concentrated form. Many thousands of men are engaged in this industry in Argentina, and the extract forms the most important forest product of the country.

Very Little Mineral Wealth. — About the only mineral product of Argentina of any consequence is petroleum. The output is still small, but it is reported that there are prospects of larger deposits than those now being developed.

Transportation. — Argentina has more miles of railroad than any other South American country; most of the lines were built with English capital, and many of them are still under British control. The main lines radiate from Buenos Aires like a great fan. A serious handicap to the railroads of Argentina, as well as of other countries of South America, is the lack of coal, which must be brought 5000 miles or more from Europe or the United States.

Most of the country roads are poor. They are three or four times as wide as our country roads; very few of them have a hard surface, and in times of rain they are a slough of mud. The farmers use ponderous two-wheeled carts, with wheels about ten feet in diameter. At times twenty or more horses are hitched to one of these carts, which may carry eight or ten tons of grain. Sometimes eight horses are driven abreast, and this explains the need of wide roads.

The Parana River, one of the great rivers of the world, provides a water route into the northern interior, and the river port of Rosario is one of the leading shipping ports of the country, second only to Buenos Aires.

Manufacture. — A country without native coal, and with but little available water power, cannot make much progress in manufacturing. Certain lines of manufacturing do not require a great deal of power, — for example, wine, dairy products, and

meat products, and these are among the leaders in Argentina. However, the city of Chicago does far more manufacturing than all Argentina.

Foreign Trade. — Argentina has the largest foreign commerce of the Latin American countries, and its foreign trade per capita is larger than that of the United States. Naturally, its exports

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FIG. 201. Interior of one of the great wool sheds in Buenos Aires. Here the wool is graded and prepared for shipment.

are mainly products of the ranch (wool, hides, meat, and tallow) and of the farm (wheat, corn, and flaxseed); these seven items make up 80 to 90 per cent of the exports. All kinds of manufactures are imported, notably textiles, steel products, and machinery. In recent years the United States has had a large part in the trade of Argentina, at times larger than that of any other nation. We are large buyers of flaxseed, wool, and

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FIG. 202. Hides from Argentina and Uruguay being unloaded from a Japanese steamer at New Orleans.

hides, but not large buyers of the other leading products of Argentina, for we produce wheat, corn, and meat in excess of our own needs. But Europe — especially Great Britain — is a very large buyer of all the products that Argentina has to sell. European countries are also anxious to sell manufactured goods. It is evident that ships can get cargoes both ways between Europe and Argentina more readily than they can between the United States and Argentina; moreover, in sailing distance Europe is nearer Argentina than is the United States. If the manufacturers of the United States are to sell their goods in Argentina, they will need to offer better prices, more pleasing goods, or better service than their European competitors.

Buenos Aires is the chief port of Argentina; it is the capital of the country and the largest city of South America.

Uruguay

Uruguay is the smallest of the South American republics, but one of the most prosperous. In soil, climate, and topography it is similar to the eastern part of Argentina. The country is a rolling, grass-covered plain almost destitute of forests. It is the size of Oklahoma and has about one and a half million people, over 90 per cent of whom are whites. It is one of the two South American countries in which white people make up most of the population. The other is Argentina, which has received much immigration from Italy and Spain.

Politically, Uruguay had a long stormy career, characterized by almost incessant civil strife and financial mismanagement. Yet in spite of this the country has made notable progress. Radiating from the capital and chief city, Montevideo, is a good railway system owned by British capital. Montevideo is a modern city in nearly every respect. Public education is gaining, and the government is seemingly stable.

A Country of One Dominant Industry. — The climate of Uruguay is delightfully mild and agreeable under the influence of a warm temperate latitude and ocean breezes. In the majority of years the rainfall is ample, but severe droughts occur on an

average once in about seven years, and millions of sheep may perish in a single season. Occasionally swarms of locusts invade the country and do enormous damage; a special branch of the national service (the *Defensa Agricola*) has been organized to combat the pests when they appear.

The rolling, grassy plains are ideal for the pasturage of sheep and cattle, and this is the one and almost only important occupation in the country. Only 5 or 6 per cent of the land is under the plow, while nearly 90 per cent is given to grazing. In no other country in the world does this single industry so completely dominate the economic life of the nation. The sheep are raised more for wool than for mutton, and next to cattle products, wool is the largest export of the country. Meat products of various kinds, prepared in some fifteen modern packing plants, form the largest item. Three of the great Chicago packing companies have plants in Uruguay; the products go mainly to the British Isles, but some reach the United States. Three items — meat products, wool, and hides — make up nine tenths of the export trade of the country, which, it is interesting to note, is larger per capita than that of any other South American country, except Argentina.

So completely has Uruguay devoted itself to pastoral pursuits that it is dependent upon imports for almost all its manufactures. The country has no minerals worth mentioning.

Brazil

The Country. — Brazil is the largest of South American countries. It is nearly 100 times the size of Portugal, to which it once belonged; and it is the only Portuguese-speaking country in America. It occupies over 40 per cent of the continent, and all but the southern end of the country lies within the tropics. This would be a serious drawback were it not for the fact that an area about ten times the size of Indiana is an elevated plateau, has a climate that is essentially temperate, and is well suited for the home of an energetic people. It is this upland region, 1000 to 3000 feet above sea level, that contains the greater part

of the enterprise, wealth, and culture of Brazil. It is here that two thirds of the railroads and nearly all of the great coffee plantations are found.

The northern half of the country belongs to the low, sweltering plains of the Amazon basin, covered with tropical forests and incapable of becoming the home of a large white population. Through this steaming, fever-infected jungle, the Amazon and its tributaries wind their way and furnish the only routes to the interior.

The Rubber Industry. — In the Amazon basin are more than a million square miles that yield scarcely any commercial products except wax, nuts, and rubber; and the rubber industry has been all but ruined by the competition of the rubber plantations of the Far East. A generation or more ago Brazil was producing 50 per cent or more of the world's rubber. Then came the increasing use of pneumatic tires, first for bicycles and then for automobiles, and the demand for rubber outran the supply (the price for a time was over $3 a pound); and rubber plantations began to be established, especially in southeastern Asia, where the climate is suitable and where labor is abundant. Soon the production of plantation rubber overtook that of wild rubber, and by 1920 it was ten times as great.

Collecting Rubber in Brazil. — The rubber trees are scattered throughout the great Amazon forests, but the producing trees are now found chiefly in the interior, far up the branches of the many rivers. The average rubber estate is a strip of land 50 to 75 miles long on both sides of a river. Along the banks are camps to which the Indians, employed as rubber gatherers, bring the rubber which they obtain by cutting incisions in the trees (Fig. 327). At these camps the thick, liquid rubber or *latex* is cured by smoking it over a fire of oily palm nuts. At various points on the rivers the leading rubber-collecting centers have grown up. Iquitos in Peru is 2300 miles up the Amazon, and is reached by good-sized vessels. Manaos, about midway up the Amazon, is the great interior rubber market of Brazil, and had a population of 50,000 in 1912. The greatest rubber center and shipping port is Para, near the mouth of the Amazon. Not long ago rubber ranked as the second export of Brazil; to-day it is not higher than sixth. The rapid decline of this, the only important industry of the Amazon basin,

brought hardship and suffering to the Indians who had come to depend upon it. It also brought heavy losses to many investors, and is keenly felt by Brazil.

The World's Demand for Coffee. — Next to tea, coffee is the world's chief beverage. It is on 20,000,000 American breakfast tables every morning; we use more than 1,000,000 pounds of coffee a day in the United States alone, and the rest of the world uses perhaps 2,000,000 pounds. While coffee is produced in the

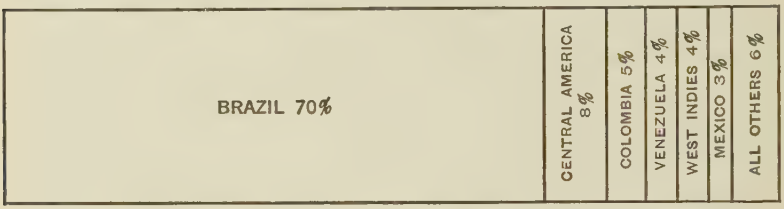


FIG. 203. Percentage of the world's coffee grown in various countries.

lands around the Caribbean, in Java, and in a number of other countries, Brazil grows about 70 per cent of the world's supply.

Where the Coffee Tree Grows. — Nearly a century of experience has taught the coffee planters of Brazil several facts: (1) that coffee is most successfully grown on hilly uplands, a thousand feet or more above the sea; such lands are well drained, and are less subject to frosts than are the valleys; (2) that the trees do better on the outer margin of the torrid zone or even across the Tropic of Capricorn, than they do in the hotter part of the torrid zone; (3) that the deep red soil formed by the decay of ancient lava rocks rich in iron and potash, is the choice soil for coffee growing.

Coffee Plantations. — Moreover, the planters have learned that coffee is most successfully produced on large plantations, backed by large capital and equipped with modern machinery for pulping and cleaning the coffee berries. The largest plantations extend over many square miles, and some include ten or more villages of workmen. Some of these plantations produce as

much as 20,000,000 pounds a year. The old Dumont plantation, for example, contains more than 100,000 acres, and has over 6,000,000 coffee trees. A still larger estate is forty by forty miles in extent. These great estates have from 1000 to 1500 laborers' families living on them.

FIG. 204. Coffee-producing regions of North and South America. (*U. S. Dept. Agr.*)

São Paulo, Santos, and Rio de Janeiro. — The greater part of the coffee of Brazil is grown in the single state of São Paulo; 95 per cent of all the exports from this state consists of coffee, and nearly all of it passes out through the port of Santos, the greatest of all coffee-shipping ports. Though there are in Brazil more than a billion coffee trees, producing an average of 12,000,000 sacks a year, the trees could all be grown on an area half the size of Minnesota. Rio de Janeiro, the capital of Brazil, has more than a million people, and is built on one of the best harbors in the world; it is second only to Santos as a coffee-shipping port.

Professor R. DeC. Ward of Harvard University has written an interesting account of his visit to a Brazilian coffee plantation, and from his account the following excerpt is taken:[1]

A Visit to the Brazilian Coffee Country. — "On the gently sloping hillsides of the northern portion of a single state of the great Brazilian Republic there are growing 700 million coffee trees. Here on the famous rich, red soil (*terra rossa*), under extraordinarily favorable climatic conditions, the state of São Paulo is producing annually about three quarters of the world's total coffee crop. . . .

[1] From the *National Geographic Magazine*, vol. 22, October, 1911, pages 908-931. Beautifully illustrated.

FIG. 205. An extensive coffee-drying floor in the coffee belt of Brazil. Long rows of young coffee trees in the distance.

"In about two hours after leaving the city of São Paulo the traveler begins to see the first considerable coffee plantations, and from that time on the journey is one of the greatest interest. Coffee is everywhere. Miles and miles of coffee trees stretch away, up and down the gentle slopes of the rolling topography, often as far as the eye can see — great broad waves of green, with the narrow lines of the red soil showing in marked contrast with the green of the leaves. It is a sight which is not soon forgotten. . . .

"The fruit, when ripe, is red, and resembles a small cherry, or cranberry, in general appearance. The coffee which we see in the grocery store is the seed of this coffee berry. . . . Before the coffee beans can be put upon the market the outer covering, the pulp, and the two inner coverings must be removed . . . . The coffee beans — hulled, cleaned, dried, and sorted — fall directly from the last machine into the bags. When these contain 132 pounds each they are sewed up and are ready for shipment to market.

"Along the roads, deep in red dust, six or eight yoke of oxen draw the heavy wagons, loaded with the precious sacks, to the nearest railroad station, in cases where the railroad does not come directly into the *fazenda*, as it often does.

"Off to the south go the trains, first to the city of São Paulo, and then down the steep eastern slopes of the Serra do Mar to the world's famous coffee port. In Santos, coffee absolutely dominates the lives of the people. Coffee is everywhere — on the streets, in the warehouses, on the train. Every one is busy with coffee. The docks are lined with two or three miles of steamers, often lying two abreast, all waiting to load coffee. . . ."

Other Resources of Brazil. — Brazil has some of the richest iron ore bodies in the world, and they are rendered still more valuable by the fact that they lie at the surface of the ground. Practically no ore had been mined up to 1923, for there is no coal in Brazil suitable for making the coke with which to smelt the ore. Small quantities of inferior coal are found in the extreme south of the country, but very little of it is mined. The gold and diamond mines are nearly worked out. The tropical forests have valuable woods — mahogany, ebony, rosewood, and cedar — but the cost of getting this timber to market is so great that little is exported. There are great pine forests in the south, but the quantity of lumber cut is not very large.

There are thousands and thousands of square miles of grazing land, partly used and partly unused. It is probable that these

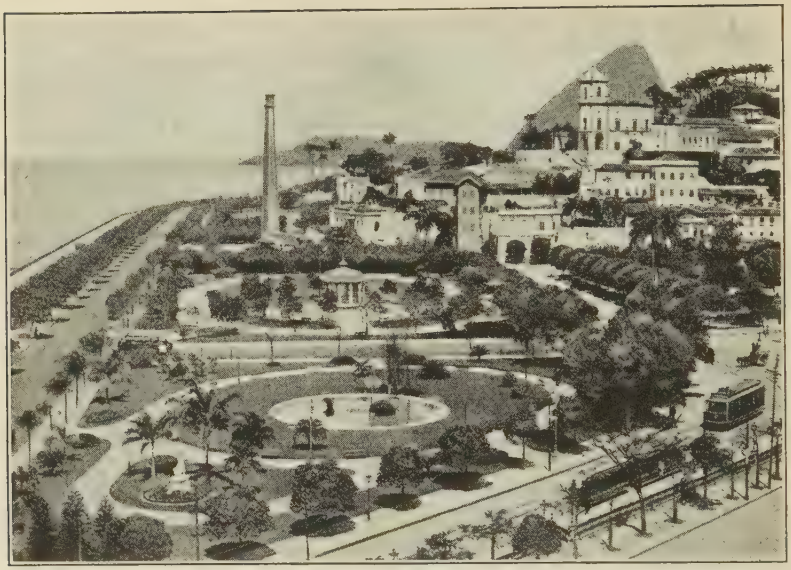


FIG. 206. A glimpse of Rio de Janeiro, the capital and largest city of Brazil. In the foreground, Gloria Park; in the background, the Sugar Loaf, a mountain at the entrance to the bay of Rio de Janeiro.

lands will some day be one of the large sources of the world's export meat. Already several American meat-packing companies have begun operations in this section of South America.

Manufactures, Transportation, and Commerce. — In spite of the lack of coal, Brazil has made rather more progress in manufacturing than most South American nations. The country has enormous possibilities in water power, which is being actively developed. Manufactures amount to about $10 per capita of the population, as compared with $400 in the United States.

The railroads are mainly located in the regions near the coast and in the southeastern district. Only a few of the railroads pay operating expenses, and the government is constantly making up deficits in order to keep the roads operating. Though Brazil has a much larger area and population than Argentina, it has a smaller railway mileage.

The foreign trade of Brazil consists mainly of the exportation of the products of plantations and forests, and the importation of manufactures and fuel. Coffee constitutes 40 per cent in value of all exports, more than half of which go to the United States. Sugar, hides, meat, cacao, and rubber are the other leading exports, but all together they about equal coffee.

The Future. — Brazil is a country with a promising future, for it has enormous resources and a large section of its land is suited to white people. Its progress may be somewhat slow, because a majority of the people belong to the colored and mixed races and have limited educational opportunities, and there is not sufficient capital there to develop the country. The government, however, is strong and somewhat more efficient than many in Latin America.

Paraguay

Paraguay, twice the size of Louisiana, has a population of about 1,000,000 people, the greater part of whom are Indians. It is the most backward of the South American republics, due in part to its inland situation, and in part to the large proportion of Indians in the population. It is low, partly forest-covered and partly open grassland. Its capital, Asuncion, is an unpaved, unsewered town which claims to have about 100,000 people; it is reached by one poorly built railroad from the south. Most of the small external trade of the country is carried by river boats on the Paraguay and Parana rivers, which connect with Buenos Aires.

Only a few lines of industry have been developed in Paraguay. They are (1) the raising of cattle; (2) the production of a small quantity of sugar and tobacco; (3) the production of oranges, which grow practically wild and are very abundant; (4) the growing and gathering of *herva maté* or *yerba maté*, often called *Paraguay tea;* and (5) the production of tanning extract from quebracho trees.

Meat Products of Paraguay. — It is estimated that there are three times as many cattle as there are people in Paraguay; but

the cattle are of an inferior type. American meat-canning plants were established in Paraguay during the World War, but were afterwards closed.

Maté. — The yerba maté is a small tree growing wild in the forests of Paraguay and southern Brazil. When dried and pulverized, its leaves make a tea which is much in favor in the countries of southern South America. So large is the demand for it that foreign corporations have acquired large tracts of land and are developing plantations after the model of coffee estates. One company has a capital of $5,000,000 and owns 8000 square miles of land. Another has a plantation of 2,400,000 trees. The plantations are yielding over 5,000,000 pounds of the tea annually. It has little sale outside of South America.

Summary of South America

Compared with North America, and particularly with the United States, South America has made slow progress. Three fourths of the continent lies in the torrid zone, and in most of this region the white people must go into the highlands to find a healthful climate. While these regions give climatic relief, they have serious drawbacks, such as the difficulty of carrying on agriculture and the high cost of building railroads. Southeastern Brazil, Uruguay, the pampa of Argentina, and the Vale of Chile are the favored lands for occupation by white people.

South America has no coal except a few low-grade, unimportant deposits. Practically all coal for the use of the railroads, power plants, and such manufacturing as is done must be brought thousands of miles overseas. Brazil and parts of Chile have large potential water power, but only a little is as yet in use.

Excepting Argentina and Uruguay, and possibly Chile, South America is populated by a majority of colored or mixed races, and a minority of white people who are doing little to improve the condition of the common people. The great majority of the colored and mixed races in all these countries cannot read or write, and many of the Indians and some of the mestizos are

little better than slaves on the great landed estates. Many of the descendants of the old Spanish and Portuguese families are wealthy, cultured, and delightful people; their sons are sent to the universities, perhaps to Europe or the United States; they form the select society of their respective countries, but as a rule they are not fond of business enterprises. Their wealth is largely in land, and they do not seem able or willing to provide the capital necessary to build railroads and develop mines or manufacturing on a large scale.

There are large possibilities in South America; much unused or poorly used agricultural land in the eastern countries, and large mineral wealth in the Andes. All the countries need capital, settlers, railroads, education, factories, and more business-like governments.

Exercise

1. What is the national language of all South American countries except Brazil? Of Brazil? Why are these languages used?
2. What is the capital city of each South American country? (Fig. 191.)
3. What cities are connected by the Trans-Andine Railroad?
4. What is the pampa of Argentina?
5. What are the chief products of the pampa?
6. Why is the number of sheep and cattle raised on the pampa likely to diminish?
7. Why do crops fail more or less frequently in Argentina and Uruguay?
8. How does Argentina compare in size with the United States? With Brazil?
9. How does Argentina compare in population with the state of New York? (See tables at end of book.)
10. What and where is the largest city of South America?
11. What are the leading products which Argentina sells to other countries?
12. Make a list of ten articles that you believe Argentina imports in considerable amounts. Tell why you select these articles.
13. What do you know about the mineral resources of Argentina? Of Uruguay? Of Brazil?
14. Why is it unlikely that either Argentina or Uruguay will become an important manufacturing country?

15. Why have more railroads been built in the East Coast countries than in the West Coast countries?

16. Why is agriculture more extensive and more profitable in the East Coast countries than in those of the West Coast?

17. Why is Europe likely to buy more of the products of Argentina and Uruguay than the United States buys?

18. What general class of goods (manufactures, food stuffs, or raw materials) would you expect the East Coast to buy of the United States? Why?

19. Where is the chief coffee region of Brazil?

20. Give an account of the coffee industry of Brazil.

21. What is the chief coffee-shipping port?

22. Under what conditions of surface and climate is coffee most successfully raised?

23. Where are the rubber forests of Brazil?

24. How is the gathering of the rubber conducted?

25. Name three important rubber-collecting centers, or cities.

26. Why has this industry declined in Brazil?

27. Why is it that hardly any railroads have been built in the Amazon basin? Why do so few people live there?

28. What is quebracho? Where is it obtained?

29. What is yerba maté? Where does it grow?

CHAPTER XVIII

THE BRITISH ISLES

Four Countries Composing the British Isles. — It is remarkable that one small country — England — no larger than Indiana, should have been able to attach to itself not only Ireland, Wales, and Scotland, but also one distant colony after another, until the largest empire of all history has been built up. The term "Great Britain" includes only England, Wales, and Scotland; "United Kingdom," until 1922, included Great Britain and Ireland. For many years the Irish desired Home Rule; that is, a parliament of their own to govern Ireland in local affairs, the island still remaining, however, a part of the United Kingdom. Later a demand for complete independence arose. In 1922 a compromise was effected by which most of Ireland became the Irish Free State within the British Empire. Northern Ireland did not join the Free State; it

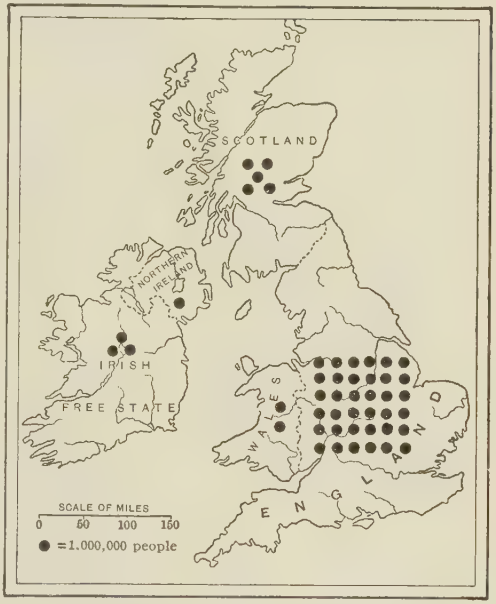


FIG. 207. Comparative population of the different parts of the British Isles. England has three fourths of the total.

FIG. 208. Physical map of the British Isles.

emains a part of the United Kingdom, but has a local parliament of its own.

Of the 47,000,000 people in the British Isles, about 36,000,000 live in England.

The British People. — No such world power as the British Empire could have been welded together except by a people of great energy, tenacity of purpose, statesmanship, and organizing ability. The British have been and still are a nation of seamen, colonizers, inventors, merchants, manufacturers, and financiers. They have been for centuries in the advance guard of the freedom-loving peoples of the earth. During the life of the British Empire, six powerful empires built up by other European nations have risen and fallen. With four of these Britain grappled in a desperate struggle, and each time won; these rivals were Spain, the Netherlands, France under Napoleon, and Germany. The other two were Austria and Russia.

Topography of the British Isles. — The physical features of the British Isles play a considerable part in the distribution of the British people and industries. The principal highlands are those of Scotland, northern England, and Wales. Those of Scotland are composed mainly of ancient crystalline rocks, which have been scoured by glaciation and now constitute rugged and relatively undesirable areas. They are inhabited by a sparse population whose principal occupations are agriculture and herding. The people in the Highlands of Scotland, in Wales, and in western Ireland are the descendants of the ancient Celtic population of Britain who found in these rough, barren hills a retreat from their Anglo-Saxon conquerors.

The principal plains include the Lowlands of Scotland, the plain of Cheshire, the great southeastern plain of England, and most of Ireland. These are much more productive agriculturally than the highlands, and include, also, most of the densely populated industrial districts.

Climate. — Climate is one of the great molders of men. No great nation has ever existed outside the temperate zone. The British Isles are much farther north than is commonly thought;

they are entirely north of the parallel (49° north) which forms much of the northern boundary of the United States. London is 800 miles farther north than Chicago, which has about the same mean annual temperature, yet London has, on an average, only fourteen days of snow a year, and during some entire years no snow falls there. The British Isles are many degrees warmer in January than the average for places in the same latitude, and many degrees cooler than the average in July. This tempering of the climate is of utmost importance to the islands and, in fact, to all western Europe. It is due to the southwesterly winds which acquire the steady temperature of the ocean during their 3000-mile journey across the Atlantic, and later impart it to the lands of western Europe. These winds bring ample rainfall to nearly all parts of the British Isles, giving most to the western highlands, and least (25 inches a year) to the eastern lowlands (Fig. 209). On the whole, the rainfall is lightest in the spring and heaviest in the fall; this is favorable to pasturage, but is bad for the harvesting of grain crops.

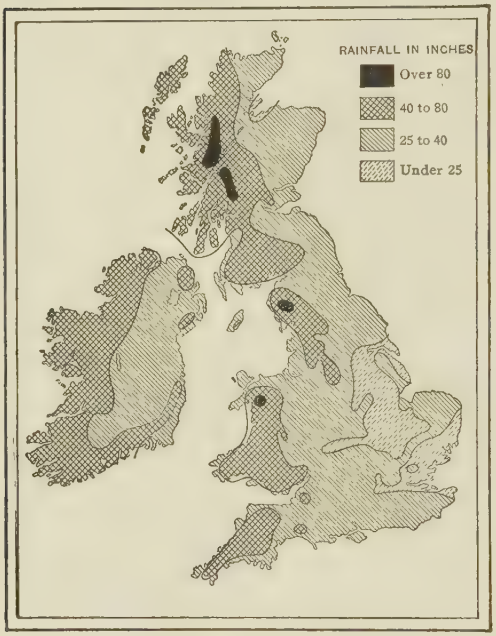


Fig. 209. Rainfall of the British Isles.

Favorable Situation. — The United Kingdom has an exceptionally favorable situation, and this has played a large part in making it the great nation that it is.

(1) It is in the *cool temperate belt*, and on the windward side of the continent; thus it is assured an invigorating climate and plenty of rain.

(2) It is at the front door of Europe, the leading continent of the world, yet it is not actually joined to the continent. It has not been invaded by a foreign army since the days of William the Conqueror in 1066. Other countries of Europe, and particularly those just across the Channel, have been ravaged by invading armies again and again; their cities have been destroyed, their lands laid waste, and their industries ruined; but the people of the British Isles — for nearly a thousand years free from such disasters — have gone on building up their industries and their commerce. While continental nations have had to maintain enormous armies, the United Kingdom has kept only a small land force. The fact that the British people live on islands has affected the nation's life and history at every point.

(3) In the last century, the Americas have become a region of very large commerce, and the most important steamship route of the world now connects western Europe with the United States. For taking part in this trade, England's position is ideal.

Thus the British nation is favored by its climate, favored by its insularity, and favored by its location.

Many Harbors. — Ages ago the British land was a part of the continent, but a sinking of the land cut it off from the mainland and transformed it into islands. Thus the river mouths were made into estuaries and became natural harbors. Most of them have required extensive improvements, however, to fit them for modern commerce. Through eight groups of harbors about 80 per cent of the commerce of the United Kingdom passes in and out. The most important of the seaports are London, Liverpool and Manchester, Hull and Grimsby, Southampton, Harwich, Glasgow, Bristol, and the great coal ports — Newcastle and Cardiff. Locate each on the map (Fig. 208). The British Isles have a larger number of important ports than the entire coast of the continent of Europe from Gibraltar to the mouth of the Elbe in Germany.

ELEVATIONS IN FEET
Over 5000
2000 to 5000
1000 to 2000
500 to 1000
Sea Level to 500
Land below Sea Level
DEPTH IN FATHOMS
Sea Level to 100
100 to 1000
1000 to 2000
Over 2000
ICELAND
Reykjavik
Mt. Hekla
FAROE IS. (Den.)
SHETLAND IS.
ORKNEY IS.
HEBRIDES IS.
ARCTIC CIRCLE
BRITISH ISLES
SCOTLAND
IRELAND
Belfast
Dublin
IRISH FREE STATE
Glasgow
Edinburgh
GREAT BRITAIN
Manchester
Liverpool
Birmingham
London
ENGLAND
Southampton
English Channel
Cherbourg
Brest
Bay of Biscay
FRANCE
Paris
Orleans
Nantes
Loire R.
Tours
Bordeaux
Limoges
St. Etienne
Lyon
Rhone R.
Bilbao
Pyrenees
Toulouse
Marseille
Monaco
Nice
Corsica
Cantabrian Mts.
SPAIN
Saragossa
Toledo
Madrid
Barcelona
Valencia
Murcia
Granada
Malaga
Cordoba
Seville
Lisbon
PORTUGAL
C. St. Vincent
Strait of Gibraltar
Gibraltar (Br.)
Tangier
Rabat
Fez
Algiers
Tunis
TUNIS
MALTA
Balearic Is.
SARDINIA
CORSICA
Mt. Blanc
Milan
Turin
Genoa
Venice
Rome
Mt. Vesuvius
Naples
Amalfi
Tyrrhenian Sea
Palermo
Mt. Etna
SICILY
Messina
Catania
Strait of Messina
Trondheim
Bergen
Stavanger
Christiania
Gothenburg
Copenhagen
Malmo
Hamburg
Stettin
Bremen
Berlin
Dresden
Prague
Brussels
Antwerp
Rotterdam
Amsterdam
Hague
Ostend
Bruges
Dunkirk
Calais
Boulogne
Dieppe
Rouen
Amiens
Le Havre
Cologne
Duesseldorf
Frankfort
Nuremberg
Stuttgart
Munich
Vienna
Leipzig
Magdeburg
Hanover
Kiel
Kiel Canal
Skagerrak
Jutland
North Sea
Irish Sea
St. George's Channel
Queenstown
Liverpool Bay
Thames R.
Humber R.
Mersey R.
Severn R.
Wash
Lofoten Is.
Arctic Ocean
Atlantic Ocean
Mediterranean Sea
10° Longitude West from Greenwich
0° Longitude East 10 from Greenw

Fig. 210
EUROPE
SCALE OF MILES
0 100 200 300 400 500
Principal Railroads
Principal Steamship Routes
Submarine Cables
COPYRIGHT, BY AMERICAN BOOK COMPANY
L.L. POATES CO., N.Y.
RUSSIA
Moscow
Petrograd
Archangel
Murmansk
Helsingfors
Riga
Kovno
Minsk
Vitebsk
Tver
Nizhni Novgorod
Kazan
Ufa
Samara
Saratof
Astrakhan
Caspian Sea
Kief
Kharkof
Kursk
Orel
Tula
Ekaterinoslaf
Kherson
Odessa
Rostof
Ekaterinodar
Sebastopol
Black Sea
Caucasus Mts.
Tiflis
Batum
Baku
Ural Mountains
Ekaterinburg
Perm
Ob R.
SIBERIA
Petchora R.
Dvina R.
Volga R.
Don R.
Dnieper R.
Dniester R.
Vistula R.
Lake Ladoga
Lake Onega
White Sea
Gulf of Finland
Kola Peninsula
Kanin Peninsula
Kolguef I.
Nova Zembla
Kara Strait
Vaigach I.
Valdai Hills
Peipus
Reval
Riga
Lemberg
Jassy
Kishenef
Bucharest
Transylvanian Alps
Danube R.
Roumania
Bulgaria
Balkan Mts.
Sofia
Turkey
Constantinople
Sea of Marmora
Dardanelles
Angora
Smyrna
Athens
Gulf of Corinth
Crete
Mediterranean Sea
Sea of Azof
Crimea
Mt. Elburz
Mt. Ararat
Armenia
Persia
Turkestan
Nat. Bdy. of Europe
Bdy. of Europe
Bdy. of Asia
Ural R.
Volga R.
Kama R.
Oka R.
Pripet R.
Donetz R.
Tsaritsyn
Uralsk
Kirghiz Steppe
Aral Sea
Cyprus

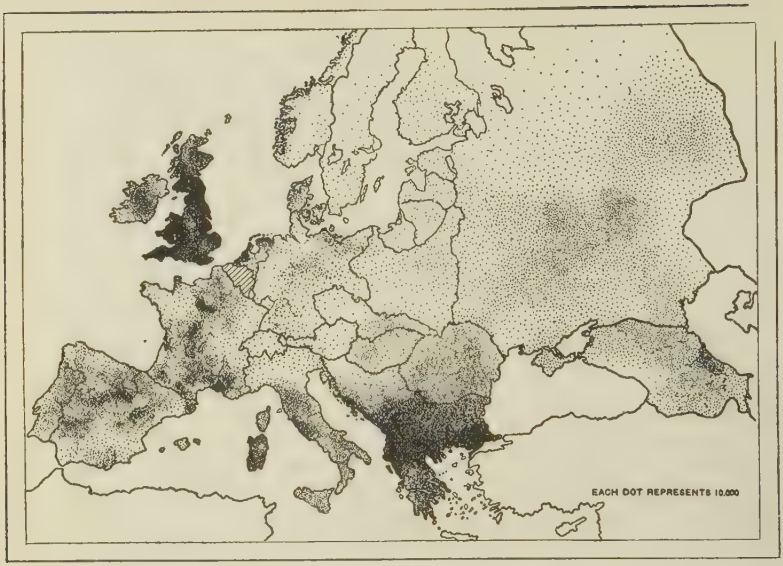


FIG. 211. Distribution of sheep in Europe and the Caucasus. (*U. S. Dept. Agr.*)

Agriculture in Great Britain. — No other great nation is so dependent upon food from overseas as is the United Kingdom; yet, up to the beginning of the nineteenth century, England was primarily an agricultural country and was an exporter of foodstuffs. Now there are more merchants in England than farmers. Three fourths of England is tillable land; yet, prior to the World War, only one fourth was under crops, and nearly half was used for pasturage. The British need great quantities of wheat and other cereals, but the heavy rainfall of their late summer is unfavorable for harvesting grain, and only about one tenth of the land is ordinarily devoted to it. Land is expensive, and farming is profitable only when most efficiently done. English wheat land is made to yield more than twice as many bushels per acre as the average yield in the United States (thirty-two bushels per acre in England, and fifteen in the United States); yet even this is not profitable. From early days Great Britain has been famous

for sheep; in the Middle Ages it was a leading source of wool for Europe, and thousands of flocks of fine sheep still graze in the British uplands. The majority of the world's choice breeds of both sheep and cattle have been developed in the British Isles.

Both Wales and Scotland are so mountainous that only one sixth of their land can be cultivated.

Ireland. — Ireland has been named the Emerald Isle because it is kept ever green by the mild climate and abundance of rain. Farming, including the raising of animals, is the principal

FIG. 212. Farming scene in Ireland, shocks of oats in the foreground. Agriculture is the leading industry of Ireland.

industry. Potatoes have been such an important crop there that we speak of them as Irish potatoes. The larger part of the island is devoted to pasturage. Ireland has many cattle and pigs; for example, eight or ten times as many pigs as there are in Scotland.

Dependence on Imported Food. — The British Isles have an area equal to only one twenty-fifth that of the United States, but they produce crops and animals equal in value to one tenth of those produced in our country. This food supply is only a quarter of what the British people need, and they are for that reason in a dangerous situation. If, in a great war, the British navy failed to keep open the sea ways to Great Britain, the nation would be promptly starved into submission — what the Germans expected to accomplish with their submarines in 1917.

Mining and Manufacturing

Production and Export of Coal. — No other mineral produced in Great Britain compares in importance with coal. It forms 93 per cent of the value of all the minerals produced in the British Isles. Ireland mines scarcely any coal, and this is one reason for her backwardness in manufacturing. Scotland has excellent coal in the south, and the shipbuilding and steel industries on the Clyde depend upon this. South Wales has very rich coal fields which produce a large part of the bunker coal for British and many other ships. In England there are four important coal fields, and several minor ones, some of them situated on the coast and several closely associated with iron mines (Fig. 213). England is the foremost coal-producing nation in Europe; and, until it was passed by the United States, was the first in the world. From the port of Cardiff in Wales great quantities of coal are exported to foreign countries and to coaling stations over a large part of the world. Britain is the greatest exporter of coal, and this export coal furnishes a return cargo to ships that bring food and raw materials to her. This certainty of securing a return cargo reduces ocean freight rates on British imports.

The British Empire Founded on Coal. — We can scarcely place too great emphasis upon the part that coal has played in the making of the British Empire. It has been, in the main, the energy of coal that has driven the wheels of British mills and factories, and that has driven the British ships which carried those

coal-made goods to every land, and brought back materials to make more goods. Great Britain's colonial empire, her merchant marine, and her naval power — each the greatest in the world — have grown with the growth of British manufacturing. Without the enormous stores of energy locked up in her coal beds, Great Britain must have occupied a wholly different and less dominating position among the nations than is now hers.

FIG. 213. Coal and iron ore in the British Isles. (*Adapted from U. S. Geol. Survey.*)

Iron. — Though less important than coal, Great Britain's iron has had no small part in her growth as a world power. Coal and iron form the very foundation upon which modern industrial nations are built; coal for power and iron for rails, locomotives, cars, ships, bridges, printing presses, tools, implements, and millions of machines which multiply man's power of production a hundred or a thousand fold.

During most of the nineteenth century Great Britain was the leading iron-producing nation. Much of the iron was found close to the coal deposits, with limestone near by. It requires a ton or more of coal and several hundred pounds of limestone to smelt a ton of iron ore; all are heavy, bulky articles, expensive to transport. England has all three of these close together and

close to the sea. Now, however, Great Britain produces only about half of the iron ore which she uses, and imports the balance mainly from Spain and Sweden. The United States mines four or five times as much iron ore as does the United Kingdom.

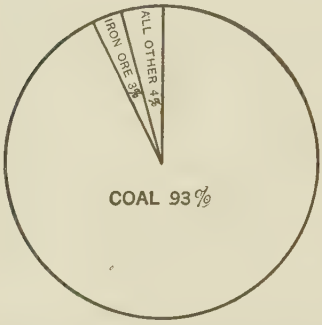


FIG. 214. Mineral products of the British Isles, with percentages of the total value.

Other Minerals. — Tin, from the Cornwall mines, which have been worked for many hundreds of years, is about the only other metal worthy of mention among British products. Potter's clay, salt, limestone, and slate are produced, but no one of them is an item of large value. A moderate quantity of petroleum products is distilled from the oil shales of Scotland.

Rise of British Manufacturing. — England is a land of mills and factories. Ten times as many people work in mills and mines as on farms. In no other country is manufacturing so large a part of the nation's life. Down to about 1800 such manufacturing as was carried on was done mainly by hand and in the homes of the workers. It was the period of the spinning wheel, the hand loom, and the hammer and anvil. Between 1764 and 1793 came a series of remarkable inventions, including the steam engine, the cotton gin, and greatly improved spinning and weaving machinery. With the exception of the cotton gin, all of these inventions were made in Great Britain, and England rapidly rose to the leadership of the world in the manufacture of textiles. So great was the effect of these

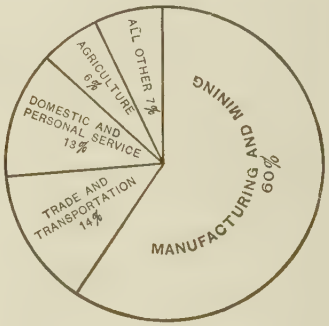


FIG. 215. Occupations of the employed in England and Wales.

changes, coupled with England's supply of skilled workers and abundant coal, that the export of cotton goods from Great Britain rose from less than $5,000,000 in 1785 to over $110,000,000 in 1815.

In the production of iron there came an equally remarkable development. Iron ores occur in many places in Great Britain. At first these were smelted with charcoal made from wood, but the industry soon outgrew this stage, and England rose to the position of the world's leader in the making of iron and steel products. The United States, however, now holds that place. These two lines, textiles (mainly cotton and woolen), and iron and steel (including steel ships), are still Great Britain's greatest industries.

Relation of Manufacturing to the British Empire.—The British Empire is the largest that ever existed, and its parts are the most widely scattered (Fig. *222*). It has possessions in every continent, and islands in every ocean, besides holding strategic points on all the great ocean routes of trade. The greater part of this empire has been acquired in the last two centuries.

The British are emphatically an industrial and commercial people. Their water power, their wealth of coal and iron, their limited extent of farm land, their mechanical and mercantile ability, all gave the nation a natural trend toward manufacturing and commerce. The need of assured markets led to the acquiring of colonies in which to sell the manufactured products and in which to secure foodstuffs and materials for manufacture. More than a third of Great Britain's exports go to other parts of the empire.

The Most Important Manufactures. — *Iron and steel* enter into the making of so many things that it is the principal line of manufacturing in all the great industrial nations. These products make up about one fifth of the total value of British manufactures.

Cotton goods are the second in value among British manufactures; in this industry Great Britain ranks second only to the United States. The great cotton-making centers are in the

Brown Bros.

FIG. 216. Spinning room in a cotton mill, England. The chief cotton-manufacturing section of England is Lancashire, with the city of Manchester as the principal center. See also Figure 217.

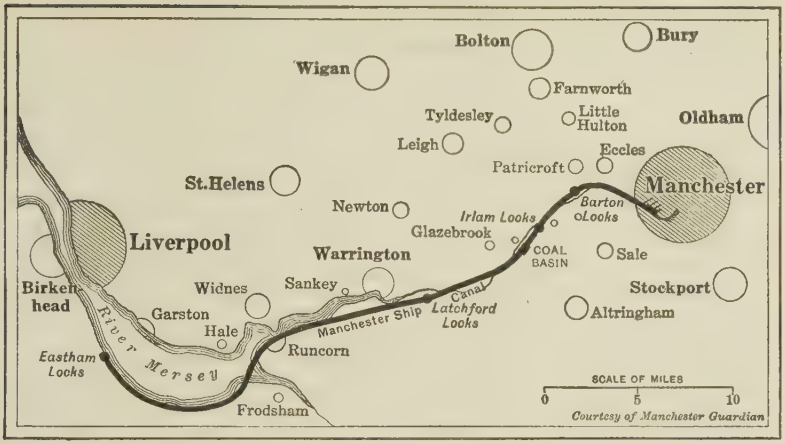


FIG. 217. Vicinity of Liverpool and Manchester, the cotton district of England.

west of England, on the side toward North America, from which most of the raw cotton comes, entering by way of Liverpool and Manchester (Fig. 208). The west side of England also has a humid climate, once essential to cotton spinning; now, artificial moistening of the air in the spinning rooms is a common practice. Not long ago the single county of Lancashire had half of the cotton spindles of the world, and it is still the greatest cotton-making region on earth. A ring of cities and towns around Manchester is almost wholly devoted to the spinning, weaving, bleaching, dyeing, and printing of cotton products, and the kindred industries (Fig. 217). Cotton goods from England constitute the largest single item contributed to foreign trade by any nation.

Woolen and linen manufactures. Wool has been for centuries England's great "staple," and to this day it is the only product of her own land that she exports to any extent. England's manufactures grew up under the leadership of wool, and a little more than a century ago her woolen manufactures had twenty times the value of her cotton manufactures. Now, British cotton goods have twice the value of woolen. English and

Scotch woolens are still among the very best made. As for centuries past, the chief centers of woolen manufactures are now in northeastern England. In addition to home-grown wool, the English mills use great quantities of imported wool, especially from Australia, Argentina, and South Africa. Excellent Irish linens are made in and near Belfast in the north of Ireland, where considerable flax is grown. But many times as much linen is made from imported flax (page 109) as from the home-grown.

Shipbuilding. The United Kingdom outranks all other countries in shipbuilding, although the United States was the leader for a period during the World War and just after it. Britain's long coast line with many harbors, her supplies of coal and iron, and her great ocean trade have all combined to stimulate shipbuilding. The River Clyde in Scotland has become famous for ships, and the lower portions of the rivers Tyne, Wear, Tees, and Thames in the east of England are but little less important. Up to 1916 any one of these centers built more ocean-going ships

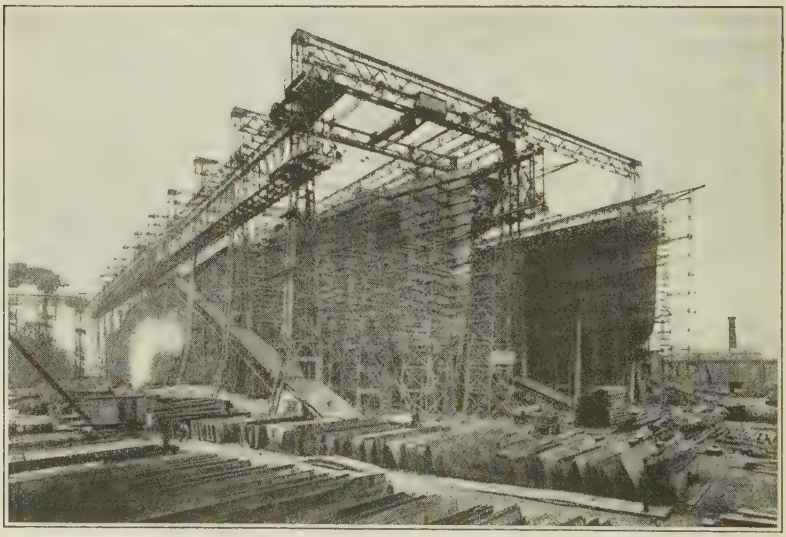


FIG. 218. Shipbuilding in Belfast. Two large ships can be seen under construction.

than the whole United States. All these rivers, except the Thames, are actually in the coal fields, or near them. Another shipbuilding center is Belfast, on the north coast of Ireland. Besides these principal regions, many other river mouths of the British Isles have shipyards which in most countries would be called important. In normal years British yards launch an average of three steamships every working day.

Summary. — The United Kingdom, like other manufacturing nations, manufactures about every kind of goods for which there is a demand. Remembering this, it is necessary to keep in mind only that (1) products of iron and steel, including machinery and ships, and (2) cotton, woolen, and linen textiles, constitute the most distinctive lines of British manufacturing. These are articles which are constantly in demand in nearly all countries.

Britain on the Sea

Merchant Fleet and Navy. — Of all nations the United Kingdom has the greatest fleet of merchant ships and the most powerful navy.[1] These are the natural outgrowth of her vast commercial interests, her insular position, and her widely scattered dependencies. Because she is insular, ships must be used more for transportation than in the case of continental nations like France or Germany, and large quantities of British commodities are carried by ships from one British port to another. Finally, the people of Great Britain are dependent upon sea transportation for three fourths of their food.

Before the World War the British merchant fleet carried a very large part of the commerce of the United States and of other nations, and is still doing so, though to a smaller extent than formerly in the case of the United States. The pre-war earnings of British ships were $500,000,000 a year. In many a foreign port the British flag was seen more frequently than all other flags combined, and in British ports British vessels outnumbered German vessels (the next in order) six to one.

[1] In capital ships (heavy battleships), however, British strength has the same limit as that of the United States — by treaty ratified in 1923.

Fisheries. — Fish are the only important food that the people of the British Isles have in excess of their own needs. Ocean fisheries are mainly carried on in shallow water (called fishing banks) near the shores of continents and of islands, usually on the continental shelf. Here food for the fish is more abundant, and the fish are more easily caught than in deep water. The British Isles are surrounded by shallow waters, for the most part less than 300 feet deep. Surrounding the islands are some 400,000 square miles of fishing waters, with still larger areas in other European waters to which British fishing fleets regularly go. The North Sea supplies the larger part of the fish caught — haddock, cod, mackerel, herring, and many less familiar species.

About 100,000 men are engaged in the British fisheries, and their annual catch, when sold to consumers, has a value of about $150,000,000. Aside from the food value of the fish, the fisheries afford valuable training for seamen, and many of the fishermen become the sailors and officers on the merchantmen and men-of-war; it is often said that Britain's fisheries were the beginning of the great commercial and naval power of that country.

Commerce

The United Kingdom carried on a larger foreign commerce than any other nation before the World War. During that war, and since, the first place has been held for part of the time by the United States. At times British imports exceed exports by more than $500,000,000 a year.

Fig. 219. Imports of the British Isles.

Imports. — The imports consist mainly of foodstuffs, cotton, wool, leather, timber, oils, hides, rubber, and metals. Besides, Great Britain (especially London) carries on a vast trade in goods which her merchants bring together from all parts of the world and then sell to other countries. Thus, Ameri-

can manufacturers buy East Indian rubber, Australian wool, and even some Canadian furs in London. The United Kingdom buys far more from the United States than from any other country, and far more than the United States buys from the United Kingdom.

Exports. — As the great industry of England is manufacturing, manufactured goods naturally form the leading group of exports. Cotton goods long led all others; this single item normally amounted to $600,000,000 a year, equal to the entire export trade of the Russian Empire in the last year before the World War. British cotton cloths go to every country on earth, but most largely to the British colonies. Practically on a par with cotton goods in the list of exports are iron and steel products, followed by coal, wool, woolen goods, and rubber. The two largest purchasers of British exports are India and the United States, followed by various European countries.

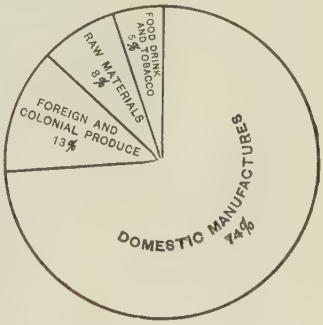


FIG. 220. Exports of the British Isles.

Railroads and Canals. — Railways had their birth in the coal-mining regions of England. In the early stage, heavy planks were laid lengthwise on dirt roads to prevent the wagon wheels from cutting into the road; then planks or timbers were fastened down, and later these gave place to wooden rails on which were hauled wagons drawn by horses. The wooden rails soon wore out, and to prevent this, strips of iron were spiked on top of them. Later, iron rails came into use, and finally, in 1814, George Stephenson made a steam locomotive for hauling cars on an English railway. But crude plank-ways and railways of the sort described above were employed more than two hundred years before the locomotive was invented.

England has one of the best railroad systems in the world; most of the important roads are double-tracked and several are

FIG. 221. View of the Albert Docks along the Thames in London

© *Keystone*

four-tracked. English canals, once important, are now little used, except the Manchester Ship Canal.

Cities of the British Isles. — Ten cities of the British Isles, listed below, are especially important for commercial and other reasons. On a blank map locate each of them:

London (7,500,000[1]), — the seat of government and principal commercial city of the empire, and largest city in the Old World.

Birmingham (920,000), — one of the leading centers of iron manufacturing.

Liverpool (800,000), — second port of the British Isles, particularly devoted to commerce with the United States and Canada.

Manchester (730,000), — the chief cotton-manufacturing city; connected with the port of Liverpool by the Manchester Ship Canal (Fig. 217).

Glasgow (1,000,000), — in the principal Scottish coal field; on the river Clyde; center of the greatest shipbuilding yards in the British Isles.

Sheffield (490,000), — famed for its cutlery.

Leeds (460,000), — one of the leading woolen-manufacturing cities of England, and leading cloth market of Europe.

Edinburgh (420,000), — political and educational center of Scotland.

Dublin (427,000), — largest city and seat of the government of the Irish Free State.

Belfast (425,000), — principal manufacturing city of Ireland; great shipbuilding yards.

British Possessions. — During the past two hundred years the British people have acquired by conquest, colonization, and other means a great number of foreign possessions. The most important, though not the largest, is British India. Canada and Australia are each about as large in area as the United States. Great

[1] This is the population of Greater London, covering an area of about 700 square miles. About 3,000,000 of this population are not completely under the city government of London. New York, with over 5,600,000, has the largest population completely under one municipal government.

FIG. 222. British possessions. The British Empire comprises about one fourth of the world's area and population.

Britain holds the best parts of Africa, also New Zealand, many islands and groups of islands in the Atlantic and Pacific, British Guiana, Hongkong, the Straits Settlements in the Malay Peninsula with the important city of Singapore, the Suez Canal, Aden at the southern end of the Red Sea, Gibraltar at the entrance to the Mediterranean, and many other possessions (Fig. 222). All the chief ocean routes are commanded by Great Britain through her possession of certain highly strategic points on these routes. She commands the entrance to both ends of the Mediterranean by means of Gibraltar and the Suez Canal. She commands the route around the south end of Africa by holding the southern extremity of the continent. She holds the Falkland Islands near the southern end of South America; she holds the island of Jamaica and several other possessions near the Panama Canal route; and groups of islands belonging to Great Britain dot the Pacific.

Summary of Significant Points Concerning the United Kingdom

1. The insularity of the country and its location, in an invigorating climate, at the front door of Europe.
2. The indented coast line and many harbors.
3. The extensive deposits of coal and iron.
4. The great development of manufacturing based upon coal.
5. The decline of agriculture and the present dependence upon imported food.
6. The need of markets for manufactured goods and of assured sources of food and raw material, leading to the acquiring of colonies.
7. The vast colonial empire — the largest in the history of the world.
8. The importance of ships to carry the imports and exports, and the consequent building of the greatest merchant marine in the world.
9. The gradual acquiring of coaling stations, naval stations, and strategic points on all of the great ocean routes.

10. The great naval power necessary to protect the home country, the widely scattered possessions, and the commerce of the empire.

Exercise

1. On the map of the British Empire, Figure 222, locate the following:

India	New Zealand	Canada
Aden	Union of South Africa	Australia
British Guiana	Malay Peninsula	Jamaica
Falkland Islands	Bahamas	Ceylon
Bermudas	Hongkong	Newfoundland
Gibraltar	Trinidad	Samoa Islands

2. The following are important cities in various parts of the British Empire. Locate them (Figs. 8, 312, 346, 358):

Halifax	Vancouver	Colombo	Melbourne
Quebec	Singapore	Aden	Sydney
Montreal	Calcutta	Cape Town	Adelaide
Toronto	Bombay	Kimberley	Wellington
Winnipeg	Madras	Johannesburg	

3. What are some of the chief characteristics of the British people?

4. With what powerful nations has Great Britain contended for European leadership? With what outcome?

5. Why are the winters in England milder than those in corresponding latitudes in eastern North America?

6. In what ways is the geographical location of the British Isles favorable?

7. Why has the United Kingdom many good harbors?

8. Why is Great Britain in a serious situation with regard to its food supply? What connection has this with the maintenance of a strong navy?

9. Why was Great Britain well suited to the development of factory industries?

10. Give an account of the various factors which aided in the early growth of manufacturing in England.

11. Show how coal is the basis of British industry and commerce.

12. Explain the relation of coal and manufacturing to the growth of the British Empire.

13. Give several reasons why the manufacture of textiles and steel products has taken first place in British industries.

14. How do you account for the location of the chief cotton-manufacturing section of England in the northwestern part of the country?

15. Give several reasons why the United Kingdom became the foremost of the shipbuilding nations. Where are its principal shipbuilding centers?

16. Why does Great Britain need a stronger navy than the United States or any other nation?

17. Why are manufacturing and foreign commerce more necessary to the people of Great Britain than to the people of the United States?

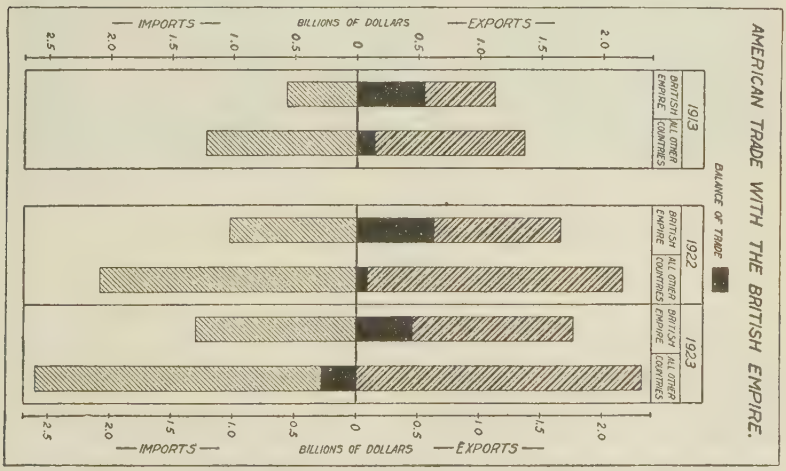
18. Why are fisheries more important to Great Britain than to the United States?

19. Name the most important parts of the British Empire.

20. What parts of the empire are important sources of food and raw materials for the home country?

21. What places are of great strategic importance to British sea power and commerce?

22. The following diagram, from *Commerce Reports* of the United States, shows that in the year 1913 American imports from the British Empire were about $570,000,000, and from all other countries about $1,200,000,000; American exports to the British Empire about $1,125,000,000, and to all other countries $1,375,000,000. What does it show for 1923? What per cent of our total foreign trade was with the British Empire that year?



CHAPTER XIX

FRANCE

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FIG. 223. Rue de Rivoli, the principal shopping street in Paris, the world's fashion center. Note the harmonious architecture and uniform height of buildings, established by law.

The Past. — France has been one of the leading nations of Europe for more than a thousand years, and during half of that period (1300 to 1800) it was the foremost nation of the world. In art, architecture, and literature; in social graces and elegance of dress; in intellectual attainments; in military prowess and in statesmanship — in fact, in practically everything, the French led the world. The University of Paris was the foremost of the

universities, and French was the language of the courts of Europe, and the language of diplomacy almost everywhere. During this period no other nation exerted such a dominant influence upon European civilization; but France was weakened by the wars of Louis XIV and Louis XV; and the long wars of Napoleon, ending in his overthrow (1815), were followed by the rise of Great Britain to the leading place among the nations.

The French are characterized by a love of pleasure, a love of beauty and quality in the goods that they produce, an ardent devotion to their country, and remarkable thrift; it is almost literally true that everybody in France saves money. This national trait made them one of the wealthiest nations in the world, though the terrible struggle between 1914 and 1918 destroyed a great deal of their wealth.

Since the French Revolution (1789) France has been twice a monarchy and three times a republic. The present republic was established in 1871, following a defeat by Prussia in a short war.

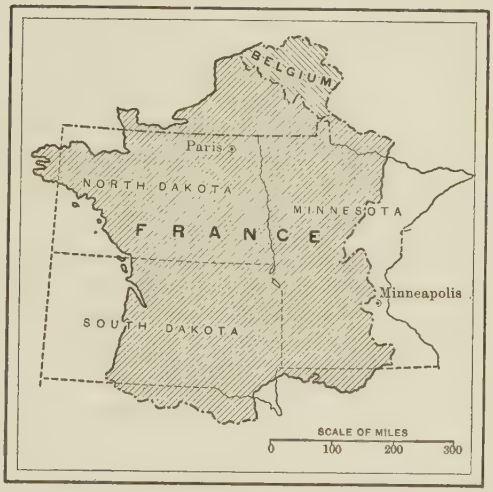

FIG. 224. Comparisons in area and latitude. It is difficult to realize that France is so far north.

Small Size but Superior Position. — France is smaller than Texas, but is larger than the British Isles, Italy, Germany, or Japan, and has more agricultural land than any of those countries. In the matter of geographical situation France is almost ideally located; it occupies a unique position. The fact that Great Britain is an island country, and the consequent ease of defending the islands in time of war, give the

United Kingdom military advantage over France, with its continental position; but in all the pursuits of peace the situation of France is exceptionally favorable.

France has an unusually agreeable climate, due to its location in the middle of the temperate zone and on the eastern side of the North Atlantic, across whose waters the southwest winds blow, carrying their even temperature and their moisture over France.

No other country faces on so many waters of the greatest commercial importance. Southern France faces the Mediterranean, through which runs the second greatest of the ocean trade routes of the world — the route by Suez to the Far East. Marseille is four or five days nearer Suez than are the ports of England. France shares with Great Britain the advantage of facing on the Atlantic Ocean and on the English Channel, which leads into the North Sea, commercially one of the most important bodies of water in the world. France has the double advantage of easy communication by land and by sea with Spain, Italy, Germany, and Belgium, with all of which it normally carries on an extensive trade.

Mild Climate and Ample Rainfall. — "Sunny France" is a term partly but not wholly merited, for northern France has more rainy days than almost any part of the United States; but southern France is a region of summer sunshine. Like other west-facing coasts in the belt of prevailing westerlies, France has an oceanic climate — mild summers and mild winters — with ample rainfall for crops; thirty inches a year is the average for all France. The southern coast of France has the typical Mediterranean climate; the summers are dry and hot, the winters are mild, with frequent rains; here olives, oranges, and mulberry trees grow. The mountainous regions of south-central and eastern France have cold winters, with much rain or snow; but snow seldom falls in Paris, and frost is almost unknown at the mouth of the Loire. On the whole, the climate of France is agreeable for human habitation and good for agriculture.

A Long Coast with No First-Class Harbors. — France has nearly 2000 miles of seacoast and many harbors, but none of them is naturally excellent. Marseille, the chief port of southern France, has only a moderately good harbor. The 800-mile sweep of the low, sandy coast of the Bay of Biscay does not supply any first-class harbor; Bordeaux, the principal port, is sixty miles up a rather shallow estuary. The ports on the English Channel [1] are better than the others, though they possess no such protection, depth, and commodiousness as the harbors of Boston, New York, San Francisco, or Seattle. Yet France is better supplied with harbors than Germany, and vastly better than Russia.

Mostly Natural Boundaries. — With the exception of the short Belgian frontier and that of Lorraine, France is everywhere bounded by the sea, the mountains, or the Rhine. Between France and Spain rises the great wall of the Pyrenees, so high and rugged that no railroads cross it, but, instead, circle each end of the range. On the Italian and Swiss borders also are high mountains, although much less difficult to cross than the Pyrenees. Forest-clad mountains and the Rhine complete the eastern boundary most of the way to Belgium. The north European plain extends from Germany across Belgium into France. It was over this plain that the German armies plunged into France at the opening of the World War in 1914. The German troops made little progress elsewhere in the invasion of France because the rugged character of the border lands enabled the French to hold the ground. Few countries are so completely set off by natural boundaries as France, and most of these boundaries are favorable to the safety of the country.

About Half Highlands and Half Lowlands. — Northern and western France is mainly a rolling plain, divided into productive farms, crisscrossed by the finest of highways, dotted with villages and cities, and everywhere served by efficient railroads. The other half of France, lying to the southeast and east, is more or less mountainous, but has fertile valleys whose vine-clad slopes

[1] Cherbourg, Havre at the mouth of the Seine, Dieppe, Boulogne, Dunkirk, and Calais.

FIG. 225. The principal wine-producing regions of France.

make France the greatest wine producer in the world (over 1,000,000,000 gallons a year).

Many Improved Rivers Connected by Canals. — In Figure 227 note that all the chief rivers have been made navigable, and that the northeast of France, and the adjacent parts of Belgium and Germany, have a network of waterways; some of these are canals and others rivers that have been improved for boats carrying burdens of over 100 tons.

An Excellent Agricultural Country. — France is one of the leading agricultural nations. About two fifths of the people are farmers, whose farms are much smaller than those in the United States. Land is more expensive and is more carefully tilled than it is in the United States; it produces less per acre, however, than the land of England and Belgium. The Paris Basin, occupying the northern fourth of the country, is especially productive.

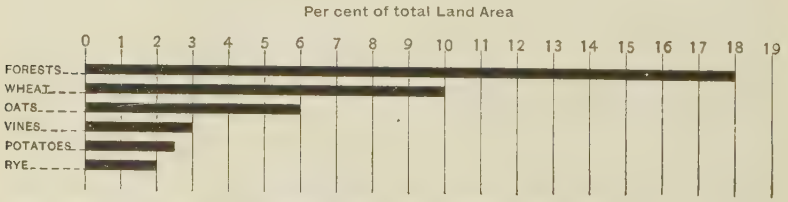

FIG. 226. Percentage of the total land area of France devoted to forests and to leading crops.

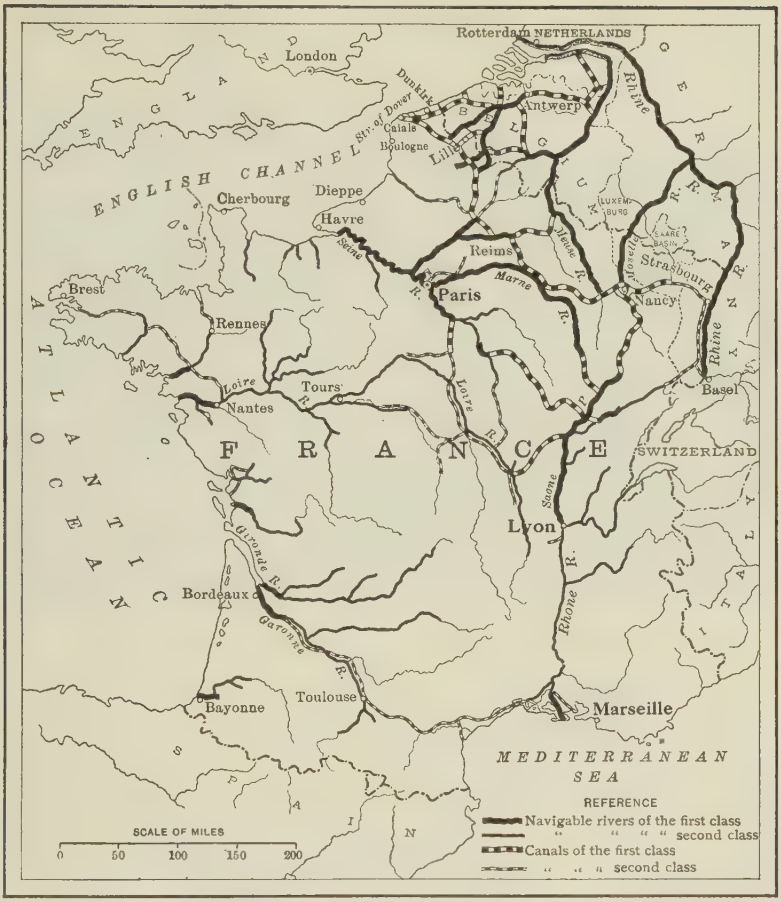

FIG. 227. Waterways of France and Belgium. The French waterways total about 7000 miles.

More than half of the tilled land in France is devoted to the growing of grain of all kinds, but wheat is the leading cereal; France ranks second in Europe and fourth or fifth in the world as a producer of wheat. Small as France is, it raises more potatoes than the United States, more grapes for wine than any

FIG. 228. Gathering wine grapes, southern France. France is the leading wine-producing nation of the world.

other country (Figs. 228, 259), and more than sufficient sugar beets to supply the country's need of sugar. In the north, where grapevines do not thrive, great quantities of apples are grown for cider. All kinds of farm animals — pigs, poultry, sheep, goats, cattle, and horses — are raised, including especially fine draft horses in the north. Large quantities of foodstuffs are imported, yet the farms of France, at their best, can almost feed the people. In few countries are agriculture and manufacturing better balanced than in France.

Limited Mineral Wealth. — Unfortunately, France has not enough of any of the important minerals, except iron and aluminum, to meet its own needs. The widely scattered coal fields supply scarcely half the needed coal. The chief coal field is near the Belgian boundary, and the mines were greatly damaged

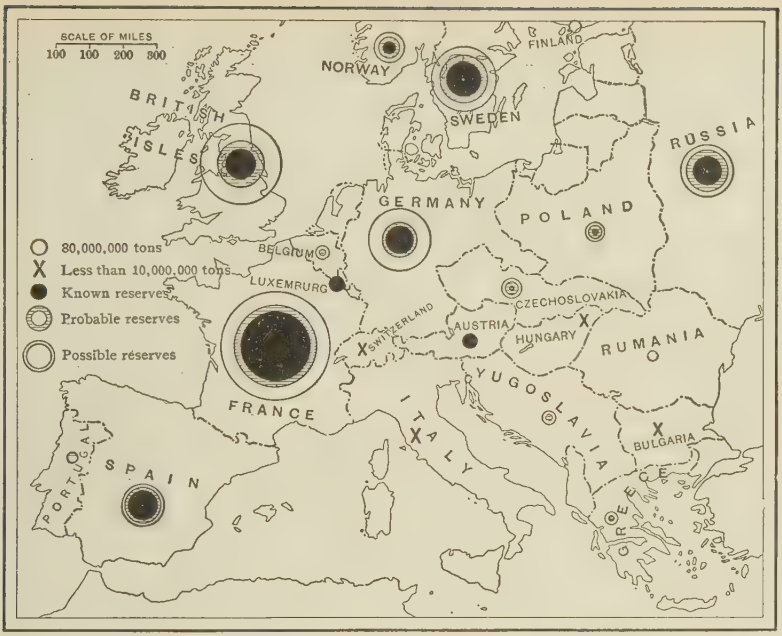

FIG. 229. Quantities of iron ore in Europe. (*Based on map by U. S. Geol. Survey.*)

FIG. 230. The Lorraine iron ore district and the near-by coal fields.

during the war of 1914–1918. The leading iron mines of France were close to the German boundary, and were held by the Germans throughout the war. By the terms of the treaty of peace in 1919, Alsace and Lorraine were restored to France, and the coal mines of the Sarre Basin in Germany were given to France. Germany's chief iron mines were in Lorraine, and their loss is a severe one to Germany but a tremendous gain to France. Aside from beds of salt and potash, beds of the finest pottery clay, an abundance of building stone, and a small amount of petroleum, France has no other minerals worth mentioning, and therein lies one of the real handicaps of France as an industrial nation.

High-Grade Manufactures. — In the quantity of its manufactures France falls far behind Great Britain and still farther behind the United States. But in the high quality and artistic finish of its manufactures, France has no superior. Silks, velvets, laces, trimmings, fine woolens, cottons, leather, tapestries, porcelains, toilet articles, wines, expensive automobiles, and luxuries generally, are lines of manufacturing in which the French excel. France has no large home supplies of raw materials, but has a class of peculiarly artistic designers and skillful workmen; and this makes it profitable to manufacture goods in whose production artistic design and fine workmanship make up much of the value of the goods.

Extensive Colonies. — France once held Canada and also a large part of the United States lying west of the Mississippi River. Great Britain took Canada, and the United States later bought the Louisiana Territory, west of the Mississippi, but since then France has been acquiring new colonial possessions, especially in Africa. Tunis, Algeria, most of Morocco, much of the Sahara and of the Sudan, and the great island of Madagascar have been acquired, and the greater part of the former German colonies of Cameroon and Togo were added to the French colonial territory at the end of the World War (Figs. 353, 358). Algeria, which is regarded as a part of the French Republic, is especially valuable, and Morocco is becoming so. France also

has possessions in the West Indies and in the Pacific Ocean, and her colony of French Indo-China, in southeastern Asia, is larger than the home country. Taken all in all, however, the colonies of France, while second only to those of Great Britain in extent, can be regarded as only moderately valuable.

Ranks Third as a Commercial Nation. — Before the World War the total export and import trade of France was less than half that of Great Britain or the United States, and somewhat more than half that of Germany. Owing to changes caused by the war, France took rank ahead of Germany in foreign trade. The imports of France are considerably greater in value than the French exports. France is a large purchaser of cereals, coal, raw cotton, wool, silk, and even of wine, despite her own enormous production. Copper, petroleum, coffee, rubber, and many other products must be imported. To other countries France sells mainly high-grade manufactured goods. About three fourths of the exports go to neighboring countries or to the French colonies. France buys nearly twice as much in value from the United States as it sells to this country.

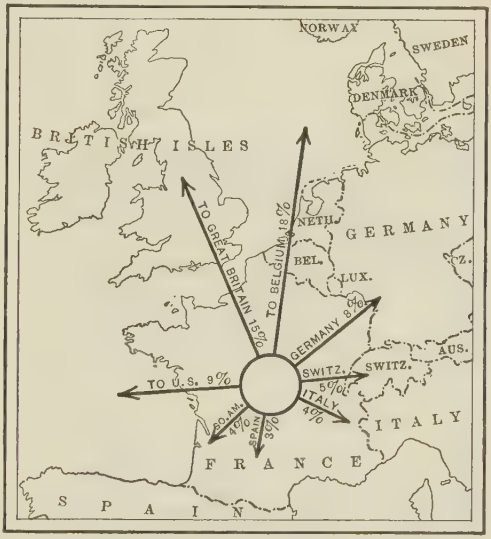

FIG. 231. Destination of 66 per cent of French exports in an average post-war year.

Cities of France. — Paris, the beautiful French capital, is the heart of the nation, the focus of its railways, and the center of its richest agricultural lands. It is first among French cities in

population (about 3,000,000), in manufacturing, commerce, and wealth; a city of beautiful streets (Fig. 223), boulevards, parks, palaces, and public buildings. The city proper is encircled by three distinct rings of defensive fortifications. It is 233 miles from the mouth of the Seine, which is navigable as far as the city by boats drawing ten feet of water.

Marseille (586,000) is the leading French port on the Mediterranean, and the second French city in size. The Rhone Valley is the great north-south thoroughfare of France, and Marseille sits at its southern gate, — not at the mouth of the Rhone, which has a swampy delta, but forty miles to the east. The city handles not only the Mediterranean commerce of France, but also by way of the Rhone Valley some commerce to and from Belgium, Holland, and even England. It is also a great manufacturing city, famous for its trade in vegetable oils and for the products made from them.

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FIG. 232. Weaving silk on a hand loom, Lyon.[1]

Lyon (562,000), on the Rhone, is the center of a manufacturing region celebrated for its silk goods. Some raw silk is produced in southern France, but much more is imported from Italy, China, and Japan. Lyon was long the leading silk-making city of the world, but has been surpassed by Paterson, New Jersey.

[1] A large portion of Lyon's silk industry is carried on in the homes of individuals, as in this case, but many hand looms have been replaced by machine looms.

Havre (163,000) is the chief French port on the English Channel.

Bordeaux (267,000), on the Garonne, is the chief port of western France and the leading city in exporting French wines.

Lille (201,000), in the chief coal-producing region of France, lies in the heart of the greatest manufacturing section.

Summary

For a thousand years France was the leading nation of Europe, but that position was lost when Napoleon was defeated in 1815 and Great Britain rose to the place of leadership. France has an exceptionally favorable situation for commerce, an excellent climate, a large proportion of good land, and a very able, thrifty, artistic, patriotic people. The population is nearly stationary, and the country is terribly burdened with debt. Coal resources are limited, but iron resources are larger than those of any other country in Europe. In general, France is not well endowed with minerals, and her ports, though numerous, are not first-class. French manufactures are noted for their artistic quality, and are largely luxuries. The roads, waterways, and railroads are among the best in Europe. Vineyards are extensive and an enormous amount of wine is made. Wheat is the leading cereal crop, but nearly all the crops of the temperate zone are produced (not including cotton). France has a large colonial empire, the greater part of which is in Africa. Paris is one of the foremost cities of the world. Marseille, Havre, and Bordeaux are leading ports. The foreign commerce of France is third largest in the list of nations (pages 583–584), but was smaller than that of Germany before the war.

Exercise

1. Why is the geographical situation of France an excellent one for commerce?
2. Why is it better than that of Great Britain? Of Italy? Of Japan?
3. Why is the rainfall of France abundant?
4. Why are the seasons milder in France than in the central United States?

5. Why are the boundaries of France more than ordinarily satisfactory as national boundaries go?

6. Why did the main German army in 1914 invade France through Belgium rather than farther south where Germany and France touch?

7. Why has the building of roads, railroads, and canals been rather easy in France?

8. Why is France to be regarded as a good agricultural country?

9. Why, do you think, does France place a high tariff on imported wheat?

10. Why is the coal situation in France unfavorable for manufacturing?

11. Why did the return of Lorraine to France especially hurt Germany?

12. Why did the chief coal and chief iron deposits of France prove to be unfortunately situated during the World War?

13. Why is a large part of the French manufactures classed as luxuries?

14. Why are the colonies of France not highly valuable?

15. Why, in your judgment, is the foreign trade of France smaller than that of Great Britain?

16. Why is the Paris Basin regarded as the heart of France?

17. Why is the port of Marseille not located at the mouth of the Rhone?

18. Why is the Rhone Valley of much importance not only to France, but also to other parts of western Europe?

CHAPTER XX

BELGIUM AND THE NETHERLANDS

Belgium

Central Position, Small Size, and Dense Population. — Little Belgium, the most densely populated country in the world (about 700 to the square mile), is about one fifth the size of Iowa, but has three times the population of that state. Indeed, it has more people (over 7,000,000) than the whole continent of Australia. Through central Belgium, villages and cities are so numerous that the tourist traveling by automobile scarcely knows when he has left one town and is entering the next. In this small country there are seventeen cities ranging from 30,000 to 600,000 population. The people are of two quite distinct racial types; those in the southeast are known as *Walloons*, a brown-eyed people who speak French. Those in the north and west are the *Flemings*, whose appearance and language resemble those of the Dutch. Belgium has been an independent nation since 1830, when it separated from the Netherlands.

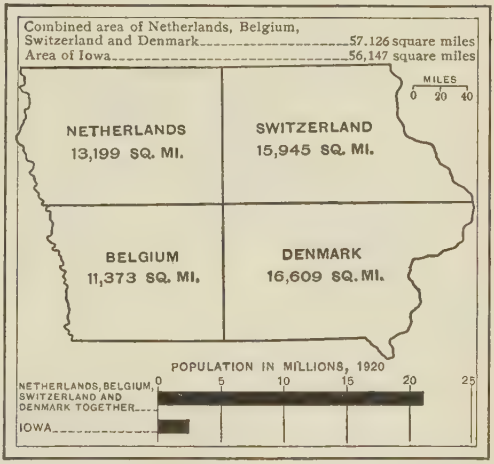

Fig. 233. Comparisons in area and population.

Geographical Position Both Favorable and Unfavorable. — When western Europe is engaged in the pursuits of peace, the geographical position of Belgium is ideal, for it lies in the heart of the greatest industrial and commercial region of the world. It touches the North Sea, across a narrow arm of which lies England and the great port of London. It touches France,

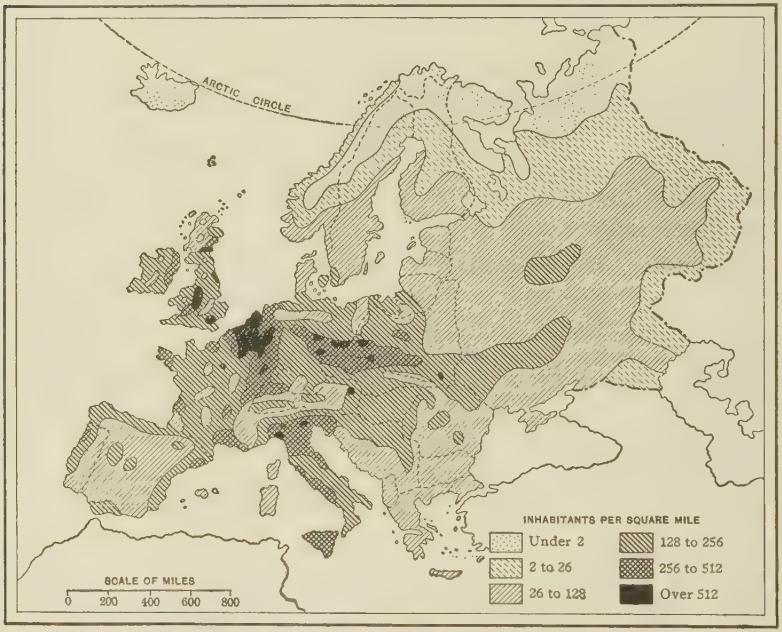

FIG. 234. Density of population in Europe.

Germany, and the Netherlands, three of the most advanced nations of the continent, and it is near the mouth of the Rhine, the chief commercial river of Europe. It is in the region of the richest coal fields and largest iron ore bodies of Europe; and within a few hours' ride are twelve of the foremost cities and ports of the world.

But when western Europe goes to war, Belgium is in a dangerous position, as was shown in the great conflict of 1914–1918.

Wedged in between the two powerful rivals, France and Germany, with an open valley across Belgium connecting them, the little country is helpless if either sees fit to strike the other through its territory. Though an inoffensive bystander, Belgium is almost sure to be drawn into the war and possibly to suffer more than either of the main belligerents. (See page 365.)

High Development of Manufacturing and Foreign Trade. — Belgium's central position, her coal mines, and her easy access to the iron of France and Luxemburg are the geographical factors which underlie her great manufacturing industries. The valley of the Meuse, which contains the Belgian coal fields, is a forest of factory chimneys. The outstanding manufactures are metal products and textiles, the two groups of goods which the markets of the world most persistently demand. For centuries Flanders (the land of the Flemings) has been the home of workers in wool and flax, to which cotton has been added. Belgian linens and laces are famous. Belgian glass, clay products, steel, machinery, guns, brass, zinc, and chemicals compete with British and American products in all the markets of the world. This little country of mines and factories is one of the important industrial countries of the world.

Naturally, a country as small as Belgium can produce only a minor part of the raw materials required by its industries; and its importations of both food and raw materials must be heavy.

FIG. 235. Railway mileage per thousand square miles of area in European countries and the United States.

Naturally, too, such a country will have to import more than it can export, for its own 7,000,000 people must be fed, clothed, and otherwise provided for. It is an interesting fact that before

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FIG. 236. A small part of the harbor of Antwerp, one of the foremost ports of the world.

the World War, Belgium had a larger foreign commerce than the great Empire of Russia with its 180,000,000 people. Its yearly foreign trade is normally over $200 per capita, which is the highest in Europe with the single exception of the Netherlands, and one of the four or five highest in the world.

A Country of Intensive Agriculture. — The northern coastal strip of Belgium is low, flat, sandy, and not fertile. The central belt is a little higher, a little more rolling, and its loamy soil is of high fertility. South Belgium is a region of ancient worn-down mountains, partly covered with forests, partly pastured to sheep, but not a good farming country. Wherever the soil of Belgium gives the industrious Belgian farmer even a fighting chance to raise a crop, he does it. Fully half of the people till little farms of two or three acres with spade and hoe, and coax them into yielding remarkable crops — often two to four times as much per acre as American farmers expect to get. Men, women, and children work in the fields. Potatoes, sugar beets, flax for linen, and

all the small grains are grown. In Belgium, as well as in France, the balance between agriculture and manufacturing is excellently preserved.

Antwerp. — Centuries ago Antwerp was one of the great ports of the world, and in the period around 1550 it was the metropolis of Europe. Later it declined, but recently it has again become one of the leading ports of the world; more than a billion dollars' worth of commerce is handled yearly at its wharves. Part of this is for Belgium, but much of it is commerce to and from Germany. The city is on the Scheldt River, fifty miles up from the sea, and unfortunately for Belgium, the lower Scheldt flows through a corner of the Netherlands, and is controlled by that country. In times of peace this makes little difference, however. The port equipment of Antwerp is very modern and efficient; there are exceptionally fine docks, warehouses, railway connections, inland water connections, and the best of dock machinery for the rapid handling of freight (Fig. 236).

The Netherlands

The Heroic Past. — The Netherlands, often called Holland, has been one of the most heroic little countries in the world. The story of its long, courageous fight for independence against the Spanish in the sixteenth century is one of the inspiring stories of history. In the seventeenth century it was one of the leading sea powers of Europe, and carried on a long, bitter, but unsuccessful struggle with Great Britain for supremacy on the ocean. At that time the extent of its colonies and the volume of its colonial trade were almost equal to those of England.

For a thousand years and more the Dutch in their low-lying country have fought back the ocean. So frequently during the eleventh and twelfth centuries did the sea break through the dikes that large numbers of people gave up their homes in despair and sought safety elsewhere. As late as 1825 the sea broke through the dikes and overwhelmed forty villages. It is said that 2336 square miles of land have been swallowed up by the sea since the thirteenth century, and that 1476 square miles of this

Keystone

FIG. 237. Making wooden shoes in the Netherlands, where such shoes are almost universally worn by the working people. They are cheaper than leather.

have been recovered. Nearly a million acres of land north of the Maas (or Meuse) have been reclaimed from the shallow sea at a cost of over $100 an acre.

The Dike System. — A quarter of the land of the Netherlands is below sea level, and 38 per cent more is less than forty inches above sea level. The greater part of the country is comprised within the delta of the Rhine, and is composed of the sand and silt and clay brought down by the river and its branches and spread upon the floor of the North Sea. The Rhine discharges through many mouths which are woven together by a network of connecting channels. A barrier of sand dunes along the ocean front has with tremendous labor been converted into a sea dike that successfully resists the battering of the waves. The banks of every stream and channel must be diked with embankments to keep the streams from flooding the low lands. Nearly 3000 miles of main dikes have been erected, and 3000 miles of canals and navigable river channels have been made or improved. Only by the ceaseless work of thousands of pumps can the low land be kept

drained and fit for agriculture and pasturage. Formerly windmills did the pumping, but later steam and gasoline engines have come more and more into use. The water is pumped from one drainage canal up to a higher one which connects with the sea. With all of the good land and cheap land that there is in the world, one wonders why the Dutch wish to go to such labor to reclaim land that lies beneath the level of the ocean. Yet they are even now engaged in a very costly enterprise for reclaiming part of the Zuider Zee. The devotion of the Dutch to their country seems to be intensified by the sacrifices which the people have made in reclaiming and defending it.

Green Pastures and Fine Cattle. — A large proportion of the land in the Netherlands (35 per cent) is ideally suited to the

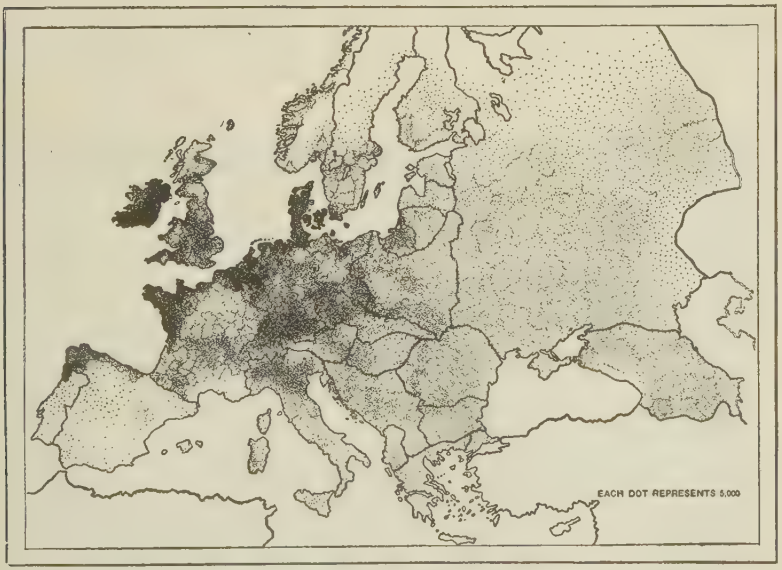

Fig. 238. Distribution of cattle in Europe and the Caucasus. (*U. S. Dept. Agr.*)

growth of grass, and is permanently used for the pasturing of cattle, especially of dairy cows. Dairying is the outstanding rural industry, and there are two or three times as many cattle to the square mile as there are in the most intensive dairying

districts of the United States. Cheese making is fully as important as butter making, and the Netherlands exports more cheese in proportion to the size of the country than any other nation in the world. Butter, too, is a characteristic export, but the country exports much more margarine — a substitute for butter, made of vegetable oils and animal fats — than it does actual butter.

The Cultivated Crops. — About the only natural resource of the Netherlands is its land, and only one fourth of this is under cultivation. All the usual crops of the temperate zone — grain, potatoes, sugar beets — are grown, but the most distinctive crop is flower bulbs, in which the Dutch specialize. Carloads and shiploads of them are sent every season to other countries, and the income to the Dutch farmers from this one source is upwards of $10,000,000 a year. Of the 6,800,000 people of Holland, about half are farmers and their families.

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FIG. 230. Tulip field in the Netherlands. Growing flower bulbs for export is an industry of considerable importance in that country.

A Great Trading and Colonial Nation. — The Netherlands has no minerals worth mentioning except small deposits of coal near the German boundary, and clay from which pottery and other clay products are made. Its manufactures are important but not very great. Its fisheries employ several thousand fishermen, and its merchant fleet is two thirds as large as that of France. The outstanding activity of the Dutch is foreign trade. For centuries they have been one of the most successful trading nations of Europe, and in spite of the smallness of their country and of their population, they rank fourth or fifth among the commercial peoples of the world. This is due to three causes: (1) the mercantile genius of the people; (2) the excellent geographical position at the mouth of the chief commercial river of Europe (the Rhine) and on the chief commercial sea of the world (the North Sea); and (3) the Dutch colonies, mainly the East Indies, the most valuable of all tropical colonial possessions (page 498). The Dutch colonies have over six times the population and more than fifty times the area of the home country. The foreign trade of the Netherlands is the largest per capita of all European countries, and is seldom exceeded by any country of the world except Cuba.

Both Amsterdam and Rotterdam are commercial ports of the first order.

Summary: The Netherlands and Belgium Contrasted

The two little countries briefly described in this chapter occupy positions almost equally favorable for purposes of commerce. The Netherlands is slightly the larger, but Belgium is much the more densely populated. Belgium has coal and a belt of very fertile land; in consequence, it has developed into a manufacturing country and also an intensively cultivated agricultural country. The land of the Netherlands is low and damp, and the country has no valuable coal deposits; in consequence, intensive dairying has proved to be a profitable occupation; but manufacturing, while important, is not outstanding. Belgium has only one colony — the Belgian Congo in Africa — and it is as yet

but little developed. The Netherlands has the most productive of tropical colonies — the greater part of East Indies. Partly in consequence of this difference, the commerce of the Netherlands is larger than that of Belgium, though the commerce of both is surprisingly large. Both countries are buffer states between the powerful rivals, Germany and France, and both have been involved in the bitter wars that have so frequently been fought in western Europe. Both are countries possessed of large capital and with large investments in many parts of the world.

Exercise

1. Why is the geographical situation of Belgium favorable (*a*) for commerce and (*b*) for manufacturing?

2. Why is it possible for Belgium to maintain so large a population?

3. Why is Belgium's situation dangerous in case of a war in western Europe?

4. Why does Belgium import large amounts of (*a*) foodstuffs and (*b*) raw materials?

5. Why is the per capita foreign trade of a country like Belgium likely to be larger than that of a country like Russia?

6. Why is agriculture much more intensively conducted in Belgium than in the United States?

7. Why is Belgium dissatisfied to have the mouth of the Scheldt River wholly in Dutch territory?

8. Why do the river banks and much of the seacoast of the Netherlands have to be diked? What are dikes?

9. Why is the geographical situation of the Netherlands even more favorable for foreign commerce than that of Belgium?

10. Why is a large proportion of the Netherlands better suited to pastures than to cultivated crops?

11. Why is manufacturing less highly developed in the Netherlands than in Belgium?

12. Why are the Dutch colonies of more than ordinary value? What and where are they?

CHAPTER XXI

GERMANY

The Former German Empire. — At the close of the Middle Ages, there were 362 German states of various kinds and sizes. A gradual consolidation went on, and by 1871 these were reduced to twenty-five, the largest and strongest of which was Prussia. The Franco-Prussian War of 1870–1871 resulted in the quick defeat of France, and brought about the welding of twenty-five German states into the German Empire, of which the King of Prussia became emperor. The new empire consisted of:

4 kingdoms (Prussia, Bavaria, Saxony, and Württemberg)
6 grand duchies
5 duchies
7 principalities
3 free cities (Hamburg, Bremen, and Lübeck)
Alsace-Lorraine, newly taken from France.

With the exception of Alsace-Lorraine, each of these parts of the empire was a self-governing state. Each of the four kingdoms had its king and nobility, its parliament, courts, and laws. Similarly, other states had their grand dukes, dukes, and princes. But all were united into the German Empire, somewhat as our forty-eight states are united into one republic, and they acted as a unit in war and in all dealings with foreign nations.

Following the defeat of Germany in the World War, the German emperor and the various kings, grand dukes, dukes, and princes were forced to abdicate, and their domains became the eighteen states in the new German republic.

The Rapid Growth of Germany between 1871 and 1914. — No other country in Europe ever had such a remarkable economic growth in so short a time as Germany had during the forty-three years from 1871 to 1914. The Germans as a people are industrious, thrifty, energetic, and obedient to authority. Their

leaders were men of energy and ambition. Their schools and universities became almost if not quite the best in Europe. Their army, navy, merchant marine, railways, waterways, and industries were built up with great rapidity and yet with thoroughness. There was intense devotion to scientific methods; and the coöperation of science, capital, and government was the most effective ever attained by any country. Population, wealth,

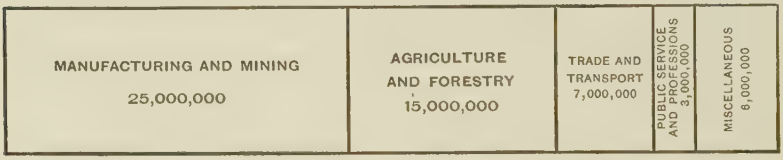

FIG. 240. Approximate numbers of people (including families) engaged in various occupations in Germany.

manufacturing, and foreign commerce grew so rapidly that by 1914 Germany stood out as one of the foremost nations of the world. Had her rulers been content peacefully to continue along these same lines of progress, Germany might in time have become the leader of the civilized nations; but instead, her rulers took a course which led to war. The result was their defeat, and the undoing of the great constructive work of the previous forty years.

Strong Military and Commercial Position. — Germany lies in the very heart of Europe. It touches or is very close to all of the important European countries. Such a position has both its strength and its weakness. In peace Germany has a most favorable situation for trade with all of the continental countries, and prior to 1914 Germany sold more goods to these countries than did any other country. Its coast line on the North Sea gives Germany two ice-free ports (Hamburg and Bremen) on this, the most important commercial sea in the world, and by the Kiel Canal the North and Baltic seas were joined in an all-German route.

In a European war, Germany has many frontiers to defend, some of them not strong natural boundaries. On the other hand, her central position permits the use of men and resources

with great effectiveness against several enemies, as was the case in the World War. For oceanic commerce, Germany is not quite so well situated as France or Great Britain, but her relative disadvantage is not great.

Losses by the World War. — By the terms of the treaty of peace at the close of the World War, Germany lost all her colonies in Africa, all her islands in the Pacific, and a small but important holding on the coast of China. Alsace-Lorraine was restored to France; over 27,000 square miles in eastern Germany were ceded to Poland; the northern part of Schlesvig, adjacent to Denmark, was restored to that country; the coal mines of the Sarre Basin (Fig. 230) were ceded to France; the most important German rivers and the Kiel Canal were placed under international control; the German army, navy, merchant fleet, and fortifications were greatly reduced; and a very heavy payment for reparations was imposed. The area of Germany was reduced about 15 per cent, and the population somewhat less than that, but her other losses were far more crippling to her than this loss of European territory.

Natural Resources

Agricultural Land. — The northern half of Germany — including the Prussian plain — is low and sandy. Most of Prussia is not naturally fertile and in the United States the land would be regarded as poor. But under German scientific methods this sandy soil has been so greatly improved that bountiful crops of rye, potatoes, and a number of other products are raised. The southern part of Germany is a plateau, much eroded by rivers, and having many rugged, non-agricultural hills and mountains, among which are lands of good quality.

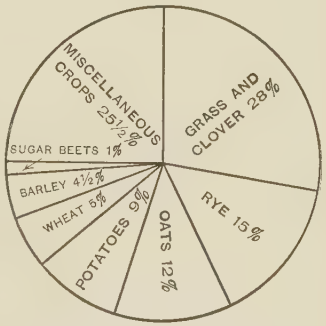

Fig. 241. Percentage of cultivated land in Germany devoted to the leading crops.

About 90 per cent of the total land is made to yield crops, grass, or forests; just about half produces cultivated crops. German agriculture is successful

more largely because of intelligent methods and hard work than because of the quality of the soil.

Large Mineral Wealth. — *Iron and coal.* Before the World War Germany had the most productive iron mines in Europe, and her output of coal was second only to that of Great Britain in Europe, and third in the world (Fig. 242). Germany's principal iron mines were in Lorraine, but these now belong to France. This loss is very serious, for one of Germany's greatest industries is the manufacture of iron and steel, and now the country has little iron ore to draw upon, and must depend mainly upon foreign sources. Important coal fields also were lost, but Germany is still well supplied with coal.

FIG. 242. Coal production (tons) in 1913, a normal year.

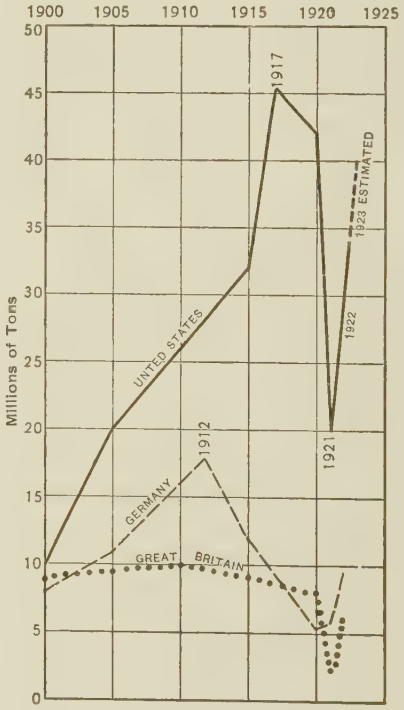

FIG. 243. Annual production of steel by the three leading nations.

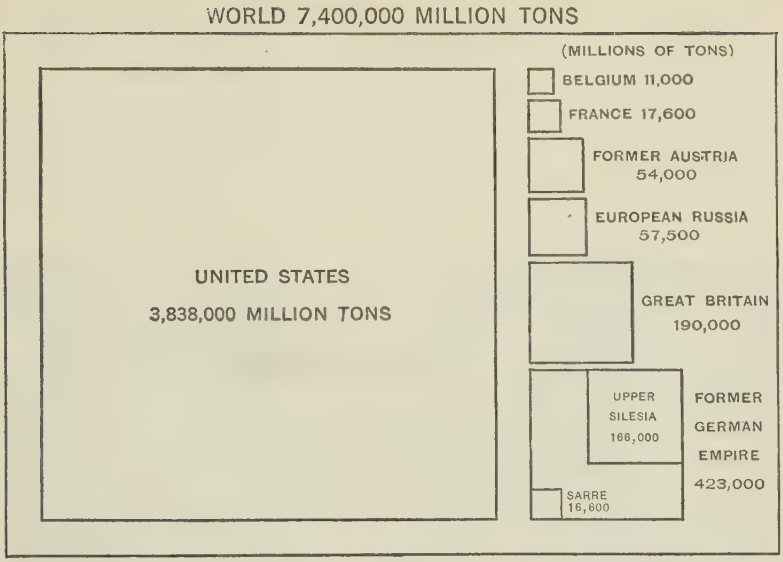

FIG. 244. The world's pre-war coal resources. The United States has about half.

Potash. About the only known beds of potash of large size were in Germany. The lesser of these is in Alsace, now a part of France, but the greater is at Stassfurt in the German state of Saxony. Potash is one of the essential salts used in the manufacture of fertilizers and is an important factor in Germany's chemical industries.

Copper, lead, zinc, silver. In the production of copper, lead, zinc, and silver Germany formerly ranked either first or second in Europe, but a long way behind the United States. As a rule metallic deposits are found more commonly in mountainous regions than in plains. South Germany is a region of mountains, and the mountain-building forces are, in part at least, responsible for the deposition of the minerals. On the other hand, Switzerland, a very mountainous country, has hardly any metals. Germany's metals are indispensable to her manufacturing industries, and they contributed greatly to her rapid industrial growth prior to 1914.

Forests and Forestry. — In the populous nations of Europe, where the demand for food is pressing, the forests have been cleared from most of the land that is suited to cultivation. But on hilly, rocky, or mountainous lands, forests are a profitable crop if they are scientifically managed. Trees can send their roots down into crevices in the rocks; they can get a foothold on steep slopes, and can grow where agricultural crops cannot.

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FIG. 245. A protected forest in Germany, whose laws for the conservation of forests have been regarded as the best in the world.

Moreover, they help retain soil on steep slopes that would quickly lose it by erosion if the trees were removed. The forests check the run-off of the surface water at times of heavy rains, and thus aid in preventing floods. The preservation of the forests on certain types of land is now recognized as an act of wisdom, and enlightened governments are seeking to bring this about.

In the practice of scientific forestry, Germany has been the leader. Much of her land — about 25 per cent — is better

suited to tree growing than to anything else, and the forest lands, whether owned by the states or by private owners, are under the management of trained foresters who decide what trees are ready to cut, replace with seedlings the trees that have been cut, guard against tree diseases, discover what sort of trees yield the most profit on certain lands, and thus make the German forests a source of income not only to the present generation, but to future generations as well. By this enlightened forest policy Germany obtained each year millions of cords of fire wood and pulp wood, and millions of feet of lumber, without depleting her forests.

The Most Efficient System of Inland Waterways in the World. Three navigable rivers flow northward across Germany — the Rhine, the Elbe, and the Oder, and each has been deepened, straightened, and otherwise improved for navigation. Canals have been built to connect rivers, and a network of waterways has been built up. The Rhine is the most important commercial river of Europe; expensive improvements have been made in it, and it carries a large amount of traffic, — mainly coal, iron, building materials, and grain. The river traffic of Rotterdam at one of the mouths of the Rhine, and of Mannheim, the most important up-river port, was, before the World War, greater in each case than the rail traffic. The river traffic of Hamburg, near the mouth of the Elbe, was greater than the rail traffic of that city. Even Berlin, on a small river (the Spree), had nearly as much traffic by water as by rail. Next to the Rhine, the Elbe carried the largest traffic.

All these rivers rise outside of Germany and are used by other nations as well as by Germany. The Rhine, which rises in Switzerland, forms part of the boundary between France and Germany and has its mouths in Holland. Because of this international character of the German rivers, they have been internationalized, or placed under the control of international commissions. Germany thus has lost control of her larger rivers and must share this with other nations. Prior to 1918, the waterways and railways of Germany were both under govern-

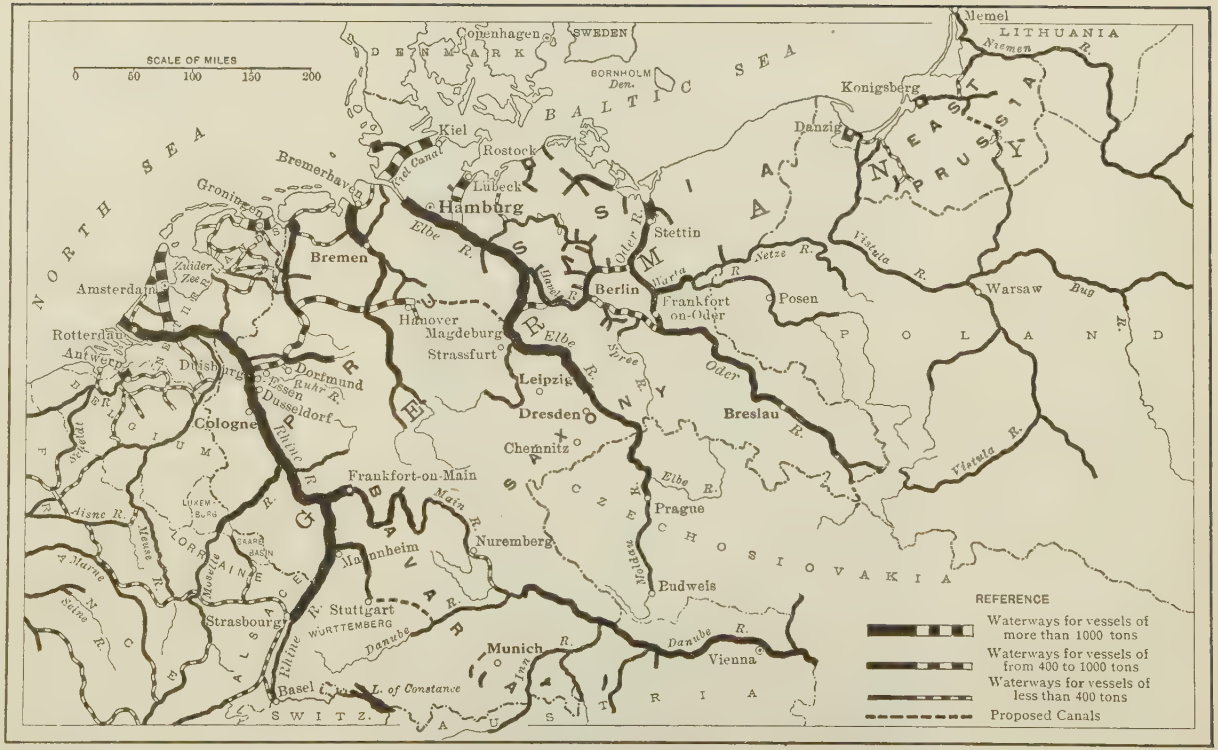

FIG. 246. The inland waterways of Germany and adjacent lands.

ment control, and they worked together; neither tried to compete with the other, as the waterways and railways of the United States have done. But the new conditions in Central Europe may change all this, and may bring about rivalry between water routes and rail routes, in which event the water routes are likely to suffer. It will be of decided advantage to Poland and Czechoslovakia, as well as to Germany, if the Elbe, Oder, and Vistula

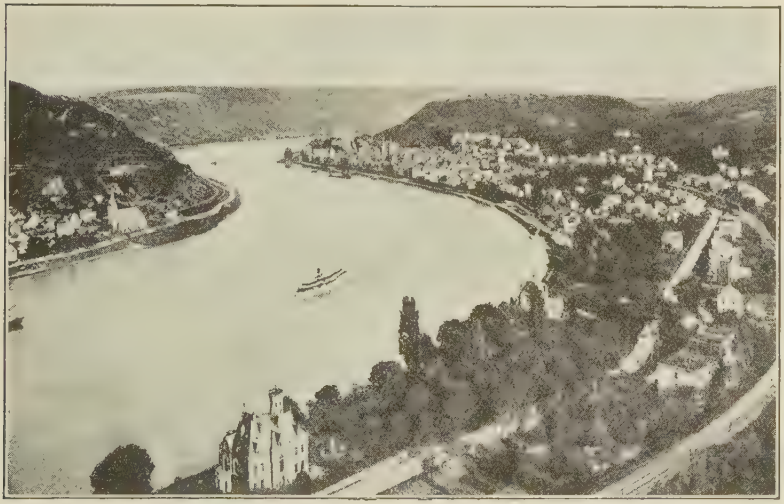

FIG. 247. The middle portion of the Rhine Valley is a rather narrow gorge through an ancient mountain region. Cities and railways are close to the river.

can be maintained in full usefulness, for they give these countries water connection with the sea, and transportation of certain heavy, low-priced commodities is usually cheaper by water than by rail.

Water Power. — Germany does not use a great amount of water power; as much is generated at Niagara Falls alone as in all Germany. This is partly due to the absence of a great amount of such power, but still more to the abundant supply of coal which Germany has. Switzerland, Norway, Sweden, Italy, and France use more water power than Germany, but these countries are all deficient in coal (Fig. 268).

Food Production in Germany

Not Self-Sufficient in Food. — It has already been pointed out (1) that only about half of the land of Germany can be used for food crops; (2) that the north German plain is sandy and not naturally fertile; (3) that south Germany is hilly or mountainous, but includes a good deal of fertile agricultural land; (4) that the Germans are intelligent farmers. The Germans employ scientific methods, use large quantities of fertilizers, work hard, and thus raise a surprisingly large amount of food on land of mediocre quality. In few countries of Europe is farming more industriously or intelligently carried on, but the country cannot feed its large population from its own soil.

Rye, the Chief Cereal. — Rye is the great cereal crop of sandy soils, and the sandy plain of north Germany raises more rye than any other cereal. Half the people seldom eat any other than rye

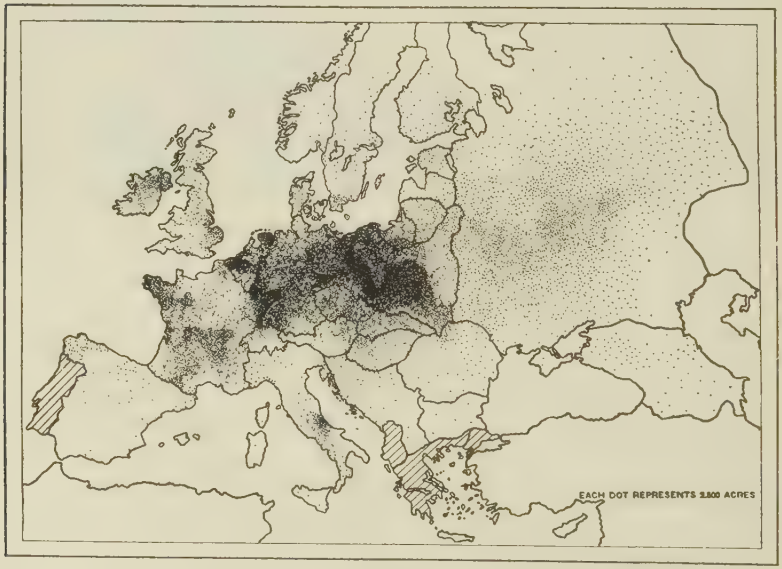

Fig. 248. Potato-growing regions. (*U. S. Dept. Agr.*)

bread. Wheat is a minor crop, and corn is scarcely grown anywhere in Germany.

Germany Leads the World in Potatoes. — Potatoes are also a crop for sandy soils, provided the soils are not too sandy. If such land is heavily fertilized it can be made to produce an enormous weight of potatoes. Germany devotes 9 or 10 per cent of her cultivated land to this one crop, while the United States devotes 1.2 per cent of its cultivated area to potatoes; and this small country of Germany — not so large as Texas — raises four times as many potatoes as the whole United States. Not only are they the commonest article of food for the people in Germany, but large quantities are fed to farm animals, and are made into starch, flour, and alcohol. Rye and potatoes are the two most distinctive food crops of the country (Figs. 241, 248, and 279).

The Leader in Sugar Beets. — Germany was long the leading country in the production of beet sugar. Before the World

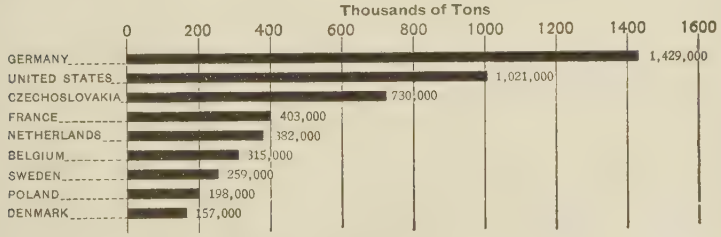

FIG. 249. One year's production of beet sugar (tons) in the leading countries (a post-war year).

War, Germany made nearly four times as much beet sugar as the United States or France, and sugar ranked among the leading exports of that country; in fact, it was the one foodstuff exported in large quantities. Whether this great German industry will be restored to its former importance remains to be seen. The disastrous effects of the World War upon the sugar industry of Europe are evident from the fact that Germany's production in 1919–1920 was only about 28 per cent of the crop of 1913–

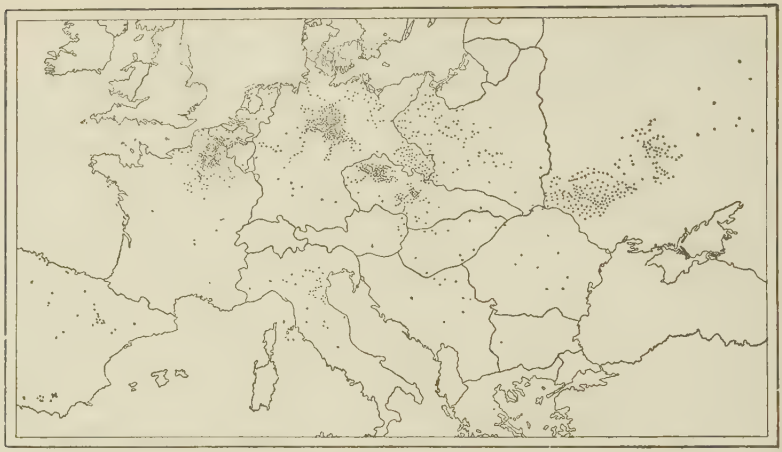

FIG. 250. Location of the beet sugar factories in Europe, before 1914; the boundaries shown, however, are those of 1923.

1914; that of France in 1919–1920 was only 22 per cent of the crop of 1913–1914.

Live Stock. — Germany makes no such specialty of cattle raising as does Denmark or Holland, yet under normal conditions only four countries of the world have more cattle than Germany; they are India, the United States, Russia, and Argentina. Cattle are far more numerous in Germany than in the United States in proportion to the areas of the two countries.

Swine are scarcely less numerous than cattle, but sheep are relatively unimportant. In meat and dairy products Germany is almost self-sufficient.

MANUFACTURING AND COMMERCE

Reasons for the Rapid Rise of Manufacturing. — (1) Germany had (and still has) coal in abundance, well located in several parts of the country.

(2) It had, between 1871 and 1918, very large iron resources in Lorraine, and smaller ones elsewhere, most of which are still retained by Germany.

(3) It has other minerals, as already explained on page 389.

(4) Germany has an excellent system of rail and water transportation, and had a large merchant marine prior to 1914. The excellence of the land and water transportation gave manufacturers their raw material and fuel at reasonable prices, and also made possible the prompt delivery of manufactures to European and world markets.

(5) The German system of education, the industrious and inventive character of the German people, and the large population, gave a supply of high-grade labor to German industries.

(6) The German universities, scientific schools, and industrial laboratories kept Germany in the forefront of scientific discovery, and of the application of science to all forms of industry.

(7) The government, in a multitude of ways, encouraged manufacturing and commerce by favorable laws and cordial coöperation.

(8) Germany is surrounded by densely populated countries that form ready markets for manufactured goods.

In short, there was remarkable coöperation of science, education, government, labor, and capital.

Characteristics of German Manufactures. — German manufactures are largely an outcome of the scientific attainments of the people. Industries in which chemistry is involved are the ones to which Germany gave greatest attention; and in the manufacture of dyes, drugs, and chemicals Germany surpassed all other countries. Her great beet-sugar factories, tanneries, breweries and distilleries, metallurgical industries, and glass factories are examples of these diversified chemical industries. Germany built up a huge iron and steel industry, including the manufacture of machinery, guns, and ships. Her textile factories, both cotton and woolen, grew rapidly. Thousands of families made toys in the homes, and skilled mechanicians made delicate apparatus and scientific instruments of all kinds. As French manufactures reflect the artistic temperament of the French people, so the German manufactures reflect the scientific training of the German people.

Germany, Great Britain, and the United States as Competitors. — Several of the great inventions that ushered in the modern age of machinery were made in Great Britain, and that country gained an early leadership in factory industries. English coal aided greatly. The United States got a later start and did not become a serious rival of Great Britain until after 1880; Germany's industrial growth came a little later still. By 1910 the United States, with its large population, great natural resources, and the great purchasing power of its people, was manufacturing more goods (in value) than Germany and Great Britain together; but the greater part of our goods were and still are consumed within this country. In 1914 both Germany and Great Britain were larger *exporters* of manufactures than the United States; but during the World War, the United States exported manufactures on an enormous scale and after the war it continued to be not only the leading manufacturing nation but also the leader in the exportation of manufactured

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FIG. 251. Building motor trucks in the Krupp works at Essen, Germany. These steel works in the Ruhr Valley are the largest in the world.

goods. Prior to the war, Germany had nearly overtaken Great Britain in manufacturing. The United States has important advantages over its two chief rivals in that it has great supplies of raw materials of nearly all kinds, while they must depend largely upon outside sources. This is especially important in time of war, when ocean shipping is disorganized and the channels of trade are obstructed.

The Rise and Decline of German Trade. — Germany's foreign commerce, like that of Great Britain and the United States, increased rapidly in the twenty years preceding 1914, and Germany's share in the world's trade grew marvelously, increasing 200 per cent in less than twenty years. When the war broke out, Germany had a combined import and export trade of over $5,000,000,000 a year, with the imports slightly leading the exports in value. This was practically equal to the foreign trade of the United States, a much larger and richer country, and not far below that of Great Britain. Germany's rise in industry and commerce was one of the most impressive events of the period. Her imports consisted very largely of the great staple raw products such as raw cotton, silk and wool, copper, rubber, hides, and skins, and also many of the foodstuffs, especially wheat. Her exports covered a wide range of products, but the outstanding fact was that they were very largely the products of German mills and factories. Exports of iron and steel products of every kind reached huge proportions. Cotton, woolen, and silk goods (textiles) came next, with beet sugar, pulp and paper, dyes and chemicals, furs and leather, following in close succession. Great quantities of coal and coke were sold to neighboring countries. In the transporting of all this heavier traffic the rivers played an important part, and the German merchant fleet aided greatly. Then came the disastrous defeat of Germany, the ruin of her fleet, the overthrow of her old order of government and industry, and the destruction of her pre-war commerce.

Cities of Germany. — On the map (Fig. 246) locate the following cities: (1) Berlin, the capital and largest city, about the

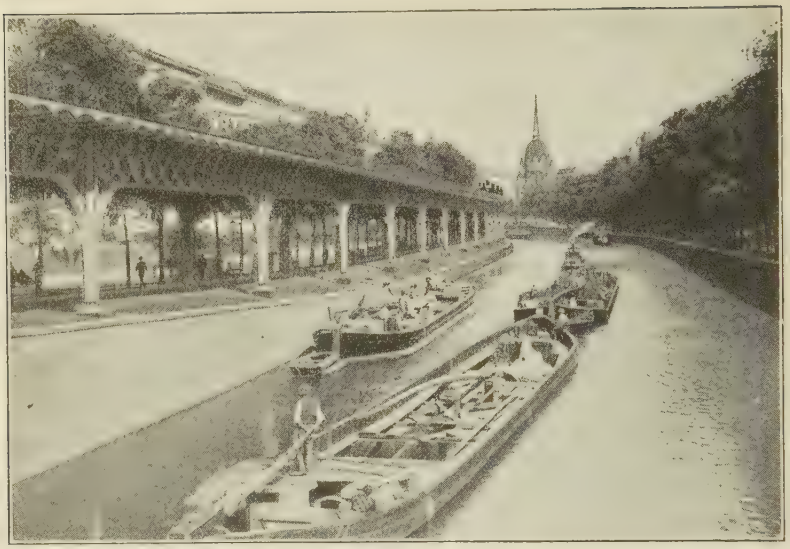

FIG. 252. Canal in Berlin. In the densely populated industrial portions of Germany and France, canals and rivers are used more than in any part of the United States.

size of Chicago; (2) Hamburg, the chief port — formerly one of the three or four leading ports of the world; (3) Munich, the chief city of Bavaria and of South Germany; (4) Leipzig, the chief city of Saxony, and formerly one of the greatest fur markets in the world; (5) Dresden, Cologne, Breslau, and Frankfort-on-Main, important manufacturing centers; (6) Essen, site of the great Krupp steel works, and center of the coal fields and vast industries of the Ruhr Valley; (7) Bremen, second port of Germany; (8) Kiel, one terminus of the Kiel Canal which joins the North and Baltic seas.

The growth of cities in Germany during the twenty years preceding the World War was more rapid than in any other country of Europe. In 1914 there were about thirty cities of 200,000 people or more; this was the outgrowth of the tremendous increase of manufacturing during that period.

Summary

Germany — (1) smaller than Texas, but having a population as great as that of all South America; (2) occupying a strategic place in the middle of Europe; (3) favored by a bracing climate, large coal resources, and (prior to 1918) great iron resources; (4) handicapped somewhat by naturally poor soil, yet this handicap offset by the generous use of fertilizers and by very intelligent farming methods; (5) producing very large quantities of potatoes, rye, and sugar beets; (6) employing a highly scientific system of forestry; (7) possessing a well-coördinated system of rail and water transportation; (8) evincing a notable devotion to scientific and efficient methods, and a special leaning to the chemical and metallurgical industries; (9) possessing a very comprehensive educational system; (10) rising to the rank of one of the foremost industrial, commercial, and military nations of the world; (11) overwhelmed by a military defeat which changed the whole course of the nation's political and economic life.

Exercise

1. Why is Prussia the leading state of Germany?
2. Why, do you judge, was the king of Prussia accepted by the other German rulers as the emperor of Germany?
3. Why were the German people stronger and more influential after 1871 than before?
4. Why did the emperor and all of the other German monarchs abdicate their thrones in 1918?
5. Why did Germany make such rapid progress between 1871 and 1914?
6. Why had Germany a right to claim a place as one of the foremost nations of the world in 1914?
7. Why is Germany's situation in Europe both favorable and unfavorable?
8. Why is Germany's position inferior to that of France for *ocean* commerce, but superior to that of any other country for *overland* commerce?
9. Why is Germany's loss of all her colonies a severe blow?
10. Why did France claim Alsace-Lorraine in 1918?

11. Why is the loss of Lorraine especially serious for Germany?

12. Why was part of eastern Germany given to Poland?

13. Why is it necessary for farmers in Prussia to use large amounts of fertilizer?

14. Why is German agriculture successful in a country whose soil is naturally sterile?

15. Why did Germany's loss of territory affect more unfavorably those industries that depend upon iron than those that depend upon coal?

16. Why are potash salts important?

17. Why is Germany naturally well equipped for manufacturing?

18. Why is Germany's forest policy regarded as excellent?

19. Why is Germany's system of transportation considered superior?

20. Why are rivers used more for transportation in Germany than in the United States?

21. Why were the chief German rivers internationalized after the World War? What does "internationalized" mean?

22. Why is water power used less in Germany than might be expected?

23. Why is Germany unable to raise all the food required by her people?

24. Why are rye and potatoes so largely raised in Prussia?

25. Why does Germany use beet sugar while we use mainly cane sugar?

26. Why was Germany able to build up her manufacturing industries very rapidly?

27. Why, in your judgment, did Germany specialize in (*a*) iron and steel making? (*b*) Chemical manufactures? (*c*) Textiles?

28. Why, in your judgment, was Germany making more rapid growth in manufacturing than Great Britain?

29. Why does the United States have an important advantage over Germany and Great Britain in manufacturing?

30. Why did Germany's foreign trade increase rapidly?

CHAPTER XXII

SWITZERLAND, ITALY, AND THE IBERIAN PENINSULA

Switzerland

The little republic of Switzerland has a special interest to millions of people. Lying at the very heart of the Alps, Switzerland has become a vacation land for the travelers of Europe and America. Between 2000 and 3000 hotels, with tens of thousands of employees, serve the tourists. Switzerland's scenery has been called the country's greatest resource.

Lack of Minerals and Agricultural Land. — Unlike many of the mountainous regions of the world, the Alps of Switzerland are notably destitute of valuable minerals. The country has to import its coal, iron, petroleum, copper, and practically every other needed mineral except salt. Fortunately, coal and iron are abundant in some of the neighboring countries.

A country as mountainous as Switzerland can have relatively little agricultural land — in this case only about 16 per cent — while nearly twice as much is used for pasturage or hay.

Agriculture and Grazing. — Switzerland is a country of small farms occupied by some 300,000 owners, who form a sturdy, industrious, home-loving peasantry. The heavy rainfall and mountainous topography make the grazing of farm animals, especially cattle, a more suitable occupation than crop production on the greater part of the farm land. Near the industrial centers the chief dairy product is fresh milk, delivered daily to customers. In the more remote valleys and on the Alpine slopes the milk is reduced to butter, cheese, and condensed milk, which reach far distant markets. Swiss cheese and Swiss milk chocolate are sold almost the world over. Nearly all of the cereals, fruits, and vegetables of the temperate zone are grown

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FIG. 253. One of Switzerland's chief resources is its scenery, and one of its chief sources of income is the hosts of tourists who visit Switzerland to enjoy that scenery.

in small quantities, but a large part of the nation's foodstuffs must be imported. Goats are more numerous than sheep, and some of the Swiss cheeses are made from goats' milk.

High Development of Manufacturing. — It is surprising to find a small, mountainous, inland country, destitute of coal or iron, developed into a manufacturing nation. Yet this is the case in Switzerland. It is an impressive example of the wise adjustment of a people to its environment. Switzerland is poor

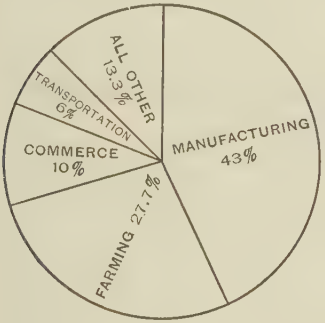

FIG. 254. Percentage of Swiss people in various occupations.

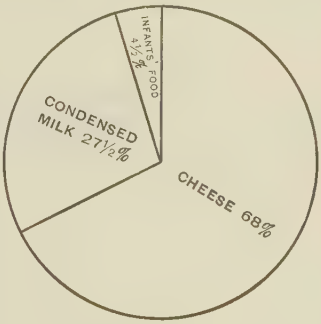

FIG. 255. Milk products exported from Switzerland.

in raw materials and in fuel for power, though it uses much water power. The cotton, raw silk, metals, and other needed raw products must be imported at somewhat higher cost, on the whole, than is paid by competing manufacturers in well-endowed countries situated on the great ocean routes.

Switzerland's chief asset as a manufacturing nation lies in her people — in her skilled workers. The country sells abroad many millions of clocks and watches, great numbers of musical, optical, and scientific instruments, and delicate machinery and wood carvings. One of the most distinctive industries is the home and factory manufacture of embroideries, in which industry Switzerland leads the world. It is also one of the important manufacturers of silk goods and fine cotton fabrics. In fact, the manufactures generally represent goods of high value in proportion to weight.

Triumphs in Transportation. —Switzerland's geographical situation places her at an important cross-roads between northern and southern Europe and to a lesser extent between eastern and western Europe. The main passes of the Alps have been utilized as links in several of the great military roads and trade routes of Europe for many centuries. More recently, tunnels have been driven beneath these passes. Excellent motor roads also zigzag up to the passes and down the other side, or reach particularly scenic points high among the mountains. It is a

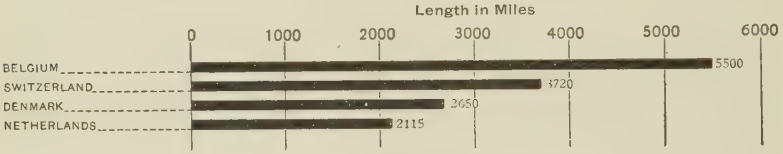

Fig. 256. Miles of railroad in four small European countries.

rather surprising fact that a country so mountainous as Switzerland should have more miles of railway in proportion to area than any other country in the world except Belgium (Fig. 235).

People and Commerce. — Switzerland is the most democratic of republics, and its people have had an age-long devotion to liberty and free institutions. It seems unbelievable that a people with no national language, and quite evenly divided between the Catholic and Protestant religions, should be so united and patriotic as the Swiss are. The majority speak German, but in five of the twenty-two cantons French is the regular language, and in one canton Italian is the language. The people are very unevenly distributed; in the canton of Geneva, for example, the density of population reaches over 900 per square mile, while in some of the Alpine cantons it is as low as 35. Geneva, Basel, and Zurich are the important industrial cities.

Switzerland has an exceptionally large foreign commerce for so small a country. In normal times this exceeds $200 per capita, putting Switzerland in the same class with Belgium and the Netherlands. It is well to remember that few countries have a foreign trade of over $100 per capita. In Switzerland, as

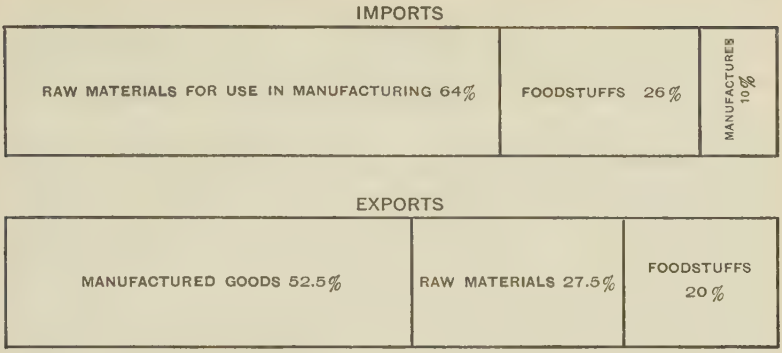

FIG. 257. Principal classes of imports and exports of Switzerland. Note the difference.

in practically all other European countries, the imports exceed the exports in total value, but the excess value of imports is offset by the great amount of money spent by foreigners in Switzerland.

ITALY

Italy's Illustrious Past. — Italy with its imperial city of Rome was the heart of the old Roman Empire, whose eagles dominated most of the world then known to Europeans. In the Middle Ages Italy was cut up into a number of independent states, including several famous city-states — Venice, Genoa, Florence, and others. After many changes, the separate parts were united into the present kingdom between 1859 and 1870, making modern Italy one of the younger European powers. Small territorial additions were secured after the World War.

Position, Climate, Area. — When the Mediterranean was the most important of all seas, Italy's geographical position was unequaled; it is still favorable for ocean commerce, for the Mediterranean is a great trade route; but it is not so advantageous as a position on or near the North Sea. Italy lies in the latitude of our northern states (37° to 47° north latitude), but it is surrounded by the mild waters of the Mediterranean and is sheltered by the Alps from cold north winds, and so is almost

subtropical in climate; it has the Mediterranean type of climate, with dry summers and rainy winters. Italy is 700 miles long, but the peninsular part in places is less than 100 miles wide; the total area is about that of New Mexico. While Italy is sometimes classed as one of the "great powers," its area and resources are not sufficient to support such a position.

The Different Parts. — Practically all of Italy's boundaries are formed by mountains or the sea. Northern Italy is partly mountainous and partly made up of the rich alluvial valley of the Po River — the choicest part of the kingdom, and the chief seat of manufacturing, wealth, and culture. The rich, level land is intensively cultivated, and the plain is dotted with cities. The peninsular part of Italy is made up mostly of the long mountain range of the Apennines and its foothills, leaving but little level land. There are also many islands, including two large ones, Sicily and Sardinia, both very mountainous.

Limited Resources. — Italy has little mineral wealth; it has hardly any coal, only a moderate supply of iron ore, and very limited amounts of other metals. In Sicily, near Mount Etna, are large deposits of sulphur, formed by the fulminations of the old volcano. This is the most valuable mineral product of Italy; the United States in years past imported most of its sulphur from Sicily. In the north are quarries of the wonderfully fine-textured white marble of Carrara and Messa, ranking second only to the famous Greek marbles of the island of Paros. The island of Sardinia yields considerable quantities of lead and zinc, and the little island of Elba yields some iron ore. The absence of coal is a serious drawback which is only partly offset by the large potential water power, especially in the north. More than 1,000,000 horse power are already installed, and three or four times as much can be developed.

The fisheries are valuable and employ more people than do the mines and quarries combined. Thin forests cover much of the mountain area, but they yield little valuable timber, though they supply fuel and large quantities of chestnuts. In spite of the rugged character of half of the country, the soil is Italy's

greatest resource, and agriculture (including fruit production) its greatest industry.

Agriculture. — Italy has two distinct parts, and they differ greatly in the agricultural practices followed by the people. One is the Po Valley, with its rich alluvial soil and level surface; the other the peninsula and islands, with their rugged mountains and scanty soil. In parts of the valley irrigation is employed, especially for rice culture. This valley is one of the parts of Europe where corn growing is important, and it is the principal seat of the extensive silk culture which gives Italy

FIG. 258. Approximate acreage of Italy's chief crops. Each dot represents 1,000,000 acres.

FIG. 259. Grape-producing regions of Europe and North Africa. (*U. S. Dept. Agr.*) France produces about 9,000,000 metric tons a year; Italy, 6,750,000; Spain, 2,450,000.

third rank (following China and Japan) as a producer of raw silk, an industry that thrives only where cheap labor is obtainable. Wheat is the leading food crop, and is raised in all parts

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FIG. 260. An olive grove in Italy. These trees have produced olives for many generations.

of the country. Italy is a land of vineyards and of olive trees; no other country devotes so much land to them, though the production of grapes is greater in France, and the production of olives is larger in Spain. The olive tree, with its life span of several centuries and its ability to thrive in a dry climate and in rocky places, is particularly suited to the Mediterranean lands. Olive oil is rich in food value, and takes the place of butter and other animal fats; it is also one of Italy's chief exports. Citrus fruits, especially lemons, are important in the south and in Sicily. Among the mountains of Italy, as of other Mediterranean lands, chestnuts form an important crop and supply food to hundreds of thousands of people. Sheep, goats, and cattle are raised in considerable numbers. Irrigation is more largely

practiced in Italy than elsewhere in Europe (5,000,000 acres). In the more favored places, three crops a year are obtained from many fields and gardens. The prevalence of malaria and the holding of much land in large estates are unfavorable to agriculture. The large estates are worked either by hired labor or by tenants, who seldom do as well with the land as the owners of small farms do with their own land.

Manufacturing. — The most serious obstacle to the development of manufacturing in Italy is the lack of coal, and the abundance of cheap labor is the greatest advantage. Manufacturing

FIG. 261. One step in making macaroni — cutting the dough.

is carried on chiefly in the north, and silk and cotton goods (from imported cotton), olive oil, and macaroni are characteristic manufactures. Straw braid and the noted Leghorn hats come from the region about the city of Leghorn. While 2,500,000 people are employed in manufacturing, several times as many

are engaged in agriculture. Italy cannot as yet be classed with the industrial nations, though the trend is in that direction, and several cities (Milan, Turin, Genoa, Florence, Naples) are industrial centers.

Commerce. — The foreign trade of Italy is larger than that of any other Mediterranean country, excepting France, and does not differ widely from that of Belgium or the Netherlands, which have much smaller populations. Italy lacks such important raw materials as cotton, wool, hides for leather, copper, and other metals, and must import them. Her leading exports are raw silk, cotton and silk goods, fruits, and olive oil. She normally imports more from the United States than from any other country, but exports most heavily to France and Great Britain. Among the chief ports for her commerce are Genoa for the north, Naples for the south, and Palermo for Sicily. Italy has a navy and a merchant fleet of considerable strength.

Cities. — Italy is a land of famous cities, most of them very old, and several of them formerly independent states of wealth and power. Rome was the capital of the greatest of ancient empires and is now the chief seat of the Roman Catholic Church. Venice, now a city of only moderate importance, was in the Middle Ages the most powerful state of the Mediterranean; and Genoa, the home of Columbus, was a close second to Venice. Florence, Pisa, Amalfi, Turin, Milan, Naples, Palermo, have all had brilliant histories, and are visited now by thousands of travelers every year. Milan, at the focus of the most important traffic routes of the north, is the chief industrial city.

Colonies. — Modern Italy is a young nation and has acquired few colonies. Libia, in north Africa, and two strips of coast in tropical East Africa, are Italy's only colonies, and none of these is of much present value to the home country.

Spain

Past and Present. — Two or three centuries ago Spain was one of the most powerful and wealthy nations in the world. Her colonial empire was of vast extent, including (1) practically all

of South America except Brazil, (2) Central America and Mexico, (3) a large part of what is now the western United States, (4) Florida, (5) Cuba and other islands of the West Indies, (6) the Philippines and other islands and groups of islands in the Pacific. Beginning about 1810, one after another of the colonies revolted and gained its independence, and to-day Spain has scarcely a dependency left. In wealth and power it ranks below other European countries of similar size.

The Government and the People. — In Spain the ruling class is polished, proud, intolerant, and seemingly able to do little to improve the condition of the common people. The upper classes shun labor and look down upon any one who engages in it. Education is sadly neglected, and only one third of the people can read and write. Outside of the large cities and a few favored localities, conditions are depressingly backward. Such roads as exist are mostly mere tracks, and hundreds of villages cannot be reached by wheeled vehicles.

The Country and its Climate. — Spain, like France, is larger than California but smaller than Texas. The population (about 21,000,000) is small for a European country of its size. Together with Portugal it occupies the Iberian Peninsula, the greater part of which is a plateau over 2000 feet in altitude; there is a strip of rather fertile lowland near the sea, but not very much elsewhere. Fully half of the plateau is barren, studded with mountain ranges and trenched by gorge-like valleys. The climate is unfavorable for general agriculture, because in the summer the country lies in the horse-latitude belt and gets scarcely any rainfall. Most of the interior is dry in summer and bleak in winter. In the south and near the Mediterranean the climate is subtropical, and good crops are raised, partly by means of irrigation and partly without.

Dependence upon Agriculture. — Poor as most of the country is for agriculture, the majority of the people are dependent upon it. About one fourth of the land produces cultivated crops, and often very poor crops. Only in the coastal strip and in a few of the valleys do crops and fruits yield abundantly. As is usually

the case in dry lands, the grazing of sheep is the main industry on the rough plateau; and there are nearly as many sheep as people in Spain. Wheat is the chief food crop, but the yield per acre is light. As in the other Mediterranean lands, vineyards and olive groves occupy a great deal of land, often that which is too steep or rocky for ordinary crops. Oranges in very large quantities, lemons, figs, almonds, and all the temperate zone fruits are grown; fruit-growing is, in fact, a prominent industry. There are three times as many mules and donkeys as horses; six times as many sheep as cows; and more goats than pigs. In spite of poor farming methods, Spain produces nearly enough food for her people, because the population is relatively small and the scale of living for the great majority of the people is low.

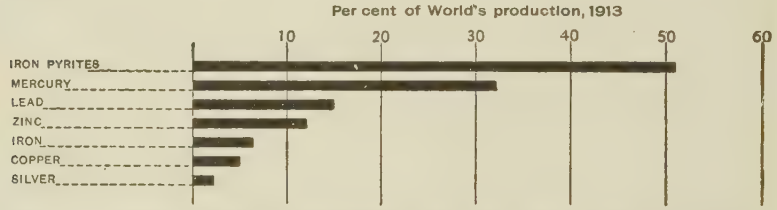

FIG. 262. Spain's percentage of the world's production of important minerals. In value produced, lead, iron, and copper rank much higher than the others.

Great Mineral Wealth. — Spain has many rich mines, but most of them are worked by foreign capital and foreign engineers. In the north, in the region of the port of Bilbao, are mines of iron ore of high quality. About 90 per cent of the Spanish iron ore is exported, mainly to Great Britain. There are good deposits of coal, but they are only partly worked and do not supply the requirements of the country. Spain is the principal producer of copper in Europe, yet the Spanish production is only one tenth that of the United States. Lead, zinc, and mercury are of considerable importance.

Backwardness of Manufacturing. — Manufacturing, like other forms of industry in Spain, is not in an advanced state. Raw cotton is imported and cotton goods are the leading manufactured

product. Most of the cotton mills are in Barcelona and in the surrounding territory. Wine and olive oil are extensively produced.

Importance of the Olive in Mediterranean Lands. — A balanced diet is necessary to health and vigor; and such a diet must include fats. Americans get fats from butter, cream, milk, fat meats, and such cooking fats as lard, margarine, and to a lesser extent from the vegetable oils. In the tropics and in the Mediterranean lands, vegetable oils are much more extensively used. Olive oil is the butter of the Mediterranean peoples and is of utmost importance in their diet. The olive tree is peculiarly the product of this region of dry summers. It has learned how to live and thrive in the rocky lands that inclose the Mediterranean. It cannot stand frost, but it can stand drought, and it lives and bears its fruit for hundreds of years; some say a thousand years or more. (Fig. 260.)

A relatively small part of the olive crop is bottled or pickled as green olives; 95 to 98 per cent of the total crop is used for olive oil, which is pressed from the pulp of the ripe olives. Figure 263 shows the regions of chief production. Spain alone produces 60,000,000 to 70,000,000 gallons of olive oil yearly, but

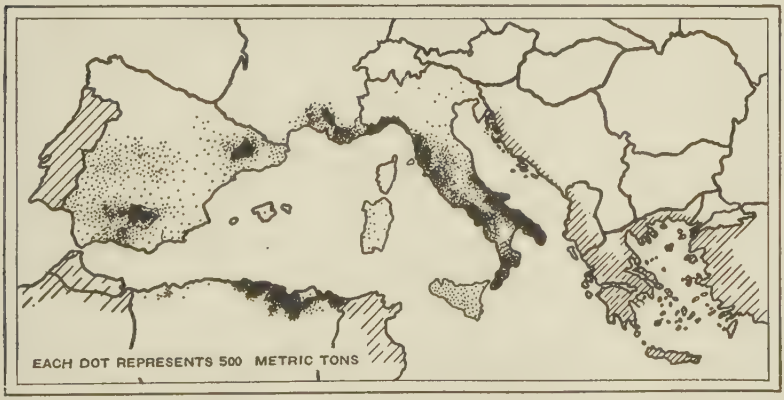

FIG. 263. Olive-producing regions in Europe and North Africa, and part of Asia Minor. *(U. S. Dept. Agr.)*

the quality is inferior to that of the Italian oil, and a great deal of Spanish oil is shipped to Italy to be purified and put up under Italian labels. While many millions of gallons are exported to all parts of the world, a much greater quantity is used by the people of the olive-producing countries.

Famous Cities. — For several centuries the Moors, a Mohammedan people from North Africa, occupied and ruled most of Spain. In many ways they were highly civilized, had at one time the leading universities in Europe, and built beautiful cities and buildings: among them the famous Alhambra, a castle and fortress near Granada. Toledo, Cartagena, Seville, Cordoba, Malaga, and Valencia are among the cities once held by the Moors. Madrid has long been the largest city and seat of government, but Barcelona is the most wide-awake, progressive industrial city. Each of these cities has over 700,000 people.

Small Foreign Trade. — Spain is now backward in commerce, as in most particulars, but during the World War it made large gains. The total exports and imports in normal times are only one third as valuable as those of Belgium. The exports of Spain are chiefly minerals, wool, olive oil, wine, nuts, fruits, cork, and a limited quantity of manufactured goods, of which cottons made from imported fiber are first in value.

Portugal

Geographic Conditions. — In general physiographic features Portugal differs little from the rest of the Iberian peninsula. It seems strange that this little country has not been absorbed into its larger neighbor, Spain. But though half the size of Missouri, and now having fewer people than the city of New York, Portugal has maintained its independence most of the time since the twelfth century. In one respect it differs greatly from Spain, for Portugal has ample rainfall for crops at nearly all times of the year. Yet the country has relatively little level land, and only about one quarter of the area is under cultivation; one half is either waste land or nearly so. The rugged mountains and hills are here and there terraced for vineyards, and nearly a million

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FIG. 264. Sorting and bailing cork in southern Spain. Nearly all of the world's cork comes from Spain, Portugal, and North Africa.

acres are given over to olive cultivation. Portugal is the leading producer of cork in the world.

The Cork Oak. — Cork is the bark of a species of oak tree that grows in all the Mediterranean countries, but especially in Portugal, Spain, Algeria, and Morocco. The greater part of the cork of commerce is produced in Portugal and Spain, where the cork-oak groves cover hundreds of thousands of acres. When the trees reach the age of about twenty-five years the bark is thick enough to be profitably stripped off (Fig. 264). In the

course of eight or ten years the tree puts on a complete new mantle of bark and may again be stripped. From these sheets of bark are cut the corks used for bottle stoppers. The waste and imperfect pieces are used for making linoleum, life preservers, packing material, etc.

Portugal of the Past. — In the century following the discovery of America, Portugal became one of the great maritime and colonizing powers, and her navigators were among the most daring and ambitious on the seas. They discovered the route around the southern end of Africa, reached India, China, and Japan, and for two centuries carried on an immensely profitable trade with the Orient. Macao, on the coast of China, and Goa on the coast of India, are two Portuguese outposts of trade that still tell of the former commercial greatness of Portugal in that part of the world. Brazil was a Portuguese colony for 300 years. The Azores and the Madeira island groups in the Atlantic, and two large colonies in the southern half of Africa still remain of the once great colonial empire of the Portuguese.

Portugal of the Present. — For centuries Portugal was a monarchy; in 1910 a revolution overthrew the ruling house and established a republic; but the republic has had a troublous career, and is scarcely stable yet. The majority of the people are poor, the land yields scantily, wages are distressingly low, and emigration is constant. Large numbers go to Brazil, where they are welcomed, and where they find their own language and traditions. Many have come to New England, and thousands have gone to the Hawaiian Islands and to the Portuguese colonies of Africa.

Portugal has small mineral wealth, small agricultural opportunities, and has achieved only the beginnings of manufacturing. Many of the people are fishermen, and the catching and canning of sardines is a national industry. Unfortunately, the country has little to sell, and imports about twice as much in value as it exports. Its close relations with Great Britain, and its geographical position in the extreme corner of the continent, with no strong and greedy neighbors to endanger its independence,

seem to make the country safe, and to promise its continuance as a separate nation.

Exercise

1. What and where are the following?

Simplon	Lisbon	The Alhambra	Lisbon
Venice	Milan	Bilbao	Trieste
Sicily	Po	Naples	Florence
Barcelona	Madrid	Rome	Granada
St. Gothard	Gibraltar	Bern	Zurich
Sardinia	Palermo	Turin	Apennines
Genoa	Blanc	Malaga	Pyrenees
Elba	Oporto	Cadiz	Azores

2. Point out the various ways in which Switzerland is showing wisdom in utilizing its resources and in finding profitable employment for its people.

3. Explain why the geographical position of Italy was more favorable at an earlier period than it is now.

4. How do you account for the fact that all the Mediterranean countries have declined in importance in comparison with countries of western Europe?

5. Give an account of the colonial possessions of (*a*) Spain, (*b*) Portugal, at the time of their greatest extent. Which country — Spain or Portugal — now has the larger colonial possessions? Where are Portugal's possessions?

6. Why do the methods of agriculture and the crops of the Mediterranean countries differ widely from those of the North Sea countries?

7. Why is manufacturing in a backward condition in Spain and Portugal? In what part of Italy is manufacturing most important?

8. Name five of the distinctive crops of the Mediterranean countries.

9. Why, in spite of its mountainous character, does Switzerland have excellent railway facilities?

10. What languages are spoken in Switzerland?

11. Why has Italy a hard struggle ahead if it is to hold a place as one of the leading powers of Europe?

CHAPTER XXIII

THE SCANDINAVIAN COUNTRIES

The Swedes, Norwegians, and Danes belong to the same racial stock, speak similar languages, and at various times two or more of the countries have been united under one government. Norway and Denmark were united for a long period, and Norway and Sweden were joined under one king from 1814 to 1906. The three countries are now independent kingdoms. The Icelanders form a separate nation under the king of Denmark, so small, however, that its share of the world's commerce is unimportant.

Norway

Position and Climate. — Norway is one of the most northerly nations in the world; a third of it extends beyond the Arctic Circle. At the extreme north the midsummer sun does not go below the horizon for a period of over seventy days. Nowhere in Norway is there any real darkness from April to August; but in midwinter, at Christmas, for example, there are less than seven hours of daylight, even in the extreme south. Yet the winter temperature along the coast is surprisingly mild, and all the harbors are ice-free the year round, due to the mild winds from the Atlantic, already described (pages 340, 364). However, the summers are very short, and in the mountains the winters are long and severe. The people live mainly near the sea, and here they have a milder climate than the people of Sweden, Finland, or Russia in the same latitude. The rainfall is heavy, and more than half of the days are cloudy. Only in western Europe do independent nations — vigorous and progressive — live at such northerly latitudes; and life in these lands is not easy.

The Land and its Influence. — Norway is 1100 miles long, and from 20 to 270 miles broad (average about 100 miles). The mountain backbone of the Scandinavian Peninsula, including the largest glaciers in Europe, lies mainly in Norway, and the country is one of jumbled mountains, deeply gashed by swift rivers, bleak and barren in winter, and inhospitable always. Twenty per cent of the land has scattered forests, but 75 per cent is practically barren. Only one acre in thirty, on an average, can be used for crops; and from these small spots, where a little soil is found, nearly half of the 2,600,000 people of Norway seek to get a living. It is a hard struggle, and long centuries of this struggle produced one of the hardiest races in all the world, the Norse. Weaklings do not survive in such a land.

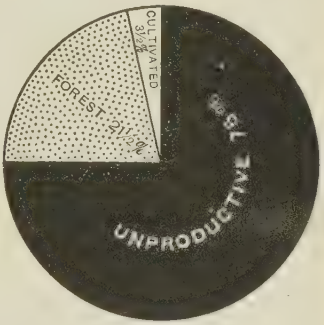

Fig. 265. Proportion of productive and unproductive land in Norway.

This sturdy race of Northmen did not all remain in their northern homes, but during the early Middle Ages many went out upon the sea and became the sea rovers of that piratical period. They made settlements all around the North Sea, conquering wherever they went, and fusing with the peoples around them. They settled in England, in northern France, in the Low Countries, and elsewhere, and imparted some of their own hardihood to many of the peoples of northern Europe.

The coast line of Norway is one of the boldest, rockiest, most intricately indented and island-fringed in the world. Long, deep arms of the sea, called *fiords*, occupying valleys eroded by ancient glaciers, reach back into the mountain land scores of miles — in two instances more than 100 miles; 150,000 rocky islands fringe this deeply fiorded coast. Such a land and such a coast make a seafaring race. The scanty soil can feed only a part of the people, but the bays have fish, and the shallow off-shore waters (the banks) have still more of them. The barren land drives a part of the men out upon the sea to procure food,

Fig. 266. A small fishing village on the coast of Norway.

and a race of fishermen, of boat builders, and of mariners is produced.

Few Natural Resources. — In Norway, glaciers have scraped away most of the soil, and agriculture is discouraging. The forests are much smaller and poorer than in Sweden, yet they supply the country's chief export, wood products. There are no mines of coal, and very little mineral wealth of any kind. However, the ample rain and snow and the steep slopes down to the sea give the rivers great power, and Norway's water power, already developing steadily, may become one of her greatest resources. Figure 268 shows how great is Norway's developed water power in proportion to its population. On the whole, Norway is a poor country, but it is peopled by a sturdy race from which America has drawn some of her hardiest immigrants.

Ewing Galloway

FIG. 207. One of the many hydro-electric plants in Norway; this plant is equipped to take nitrogen from the air and use it in the production of nitrates.

Industries. — With few minerals and few raw materials except wood, manufacturing can make only slow headway. Lumber, paper, and paper pulp are the leading lines of manufacturing. Nearly as many people are engaged in fishing as in manufacturing, and no people in the world are more largely a seafaring people than the Norwegians. Though one of the smallest of nations in population, Norway ranks high in the number of its merchant ships; it has, for example, about double the tonnage of ships possessed by Sweden. Most of these ships carry the commerce of other nations, for the commerce of Norway itself is small.

Cities. — Norway has only one large city, — the capital, Christiania, with a population of about 260,000. The great fishing port, Bergen, has 90,000; fifteen other cities have populations of 10,000 to 55,000; they are nearly all in the south and on the fiords.

Sweden

Sweden is considerably larger than Norway, and has four times as much farm land — mostly in the south where the climate is oceanic and reasonably mild; it has extensive forests, rich iron ore deposits, abundant water power, and valuable fisheries. It is far from being a rich country; yet, of the three Scandinavian kingdoms, it has the largest resources and largest commerce, and has as many people as both Norway and Denmark together, or nearly 6,000,000. In the seventeenth century, Sweden was one of the leading powers of Europe.

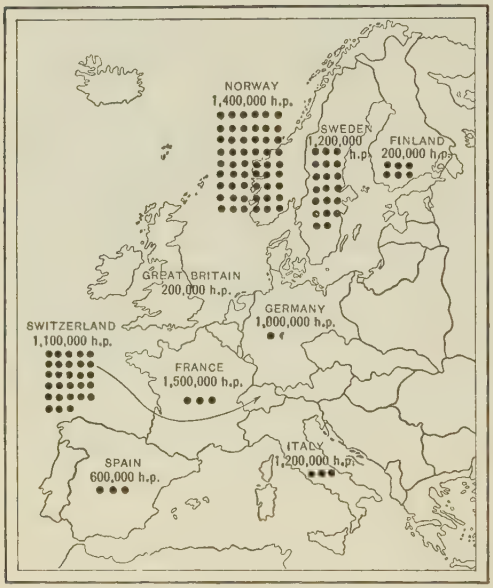

FIG. 268. Total developed water power, 1920: each dot represents 10,000 horse power for each million of population. For example, Sweden has 200,000 horse power for each million of population, and Italy only 30,000, though each has a total of 1,200,000 h. p. developed water power.

Agriculture the Chief Occupation. — Only 10 per cent of the land is given to crops; Sweden has one fourth as much cultivated land as Illinois. About half the people are farmers, yet not enough food is raised for home requirements. Farms are mostly small, averaging twenty-five acres in size, and the great majority of them are worked by their owners. The crops are those of the northern lands — oats, hay, rye, barley, wheat, potatoes, and sugar beets. Dairy products and meats are exported in considerable quanti-

ties. Agriculture is still the mainstay of the people, though declining in comparison with manufacturing.

Forest Products, a Leading Source of Income. — More than half of the land is forest, and half of Sweden's exports in value are forest products. The United States is the only country that sells abroad more lumber and timber than Sweden. More than a thousand sawmills are supplied with logs which float down the many short, swift streams. Sweden is a large exporter of matches and wood pulp for paper, and of both the United States is a purchaser. Sweden's forests are near the sea, and the products reach other European nations cheaply. One of her writers has said: "The future of Sweden lies in her forests."

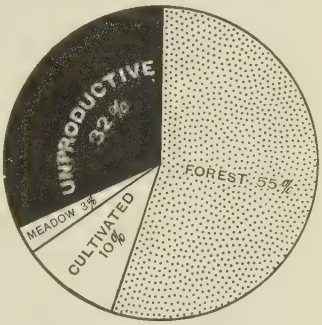

FIG. 269. Proportion of productive and unproductive land in Sweden.

Rich Iron Ore Deposits. — For centuries Sweden has been famous for the high quality of her iron, much of which was and still is smelted with charcoal. More recently, larger deposits of very high-grade iron ore have been found in Lapland, north of the Arctic Circle; but there is no coal near at hand, and not much

FIG. 270. Percentage of Europe's known and probable reserves of iron ore located in each country. (*Data from U. S. Geol. Survey.*)

anywhere in Scandinavia; so the ore is mostly shipped to coal-producing countries, especially to Germany and England, where it is smelted. None of the great industrial nations of Europe has such high-grade iron ores as those of Sweden. Several other European nations mine more ore, but it is of lower grade; that

FIG. 271. Lumber mills in northern Sweden. See Figure 273.

is, it yields less metallic iron per ton of ore. The waters of the Baltic Sea are closed by ice in the winter; and so, to provide an outlet for iron ore at this season, a railroad was built across northern Norway to an ice-free port on the Atlantic coast.

Manufactures. — Though lacking in coal, Sweden has much water power. Her chief raw materials are wood from her forests, iron from her mines, and grain from her farms. Much of the flour milling, wood working, and leather tanning is still done in small establishments supplying only local needs. Large sawmills, pulp mills, paper mills, match factories, and iron foundries produce a surplus for export (Figs. 272, 273).

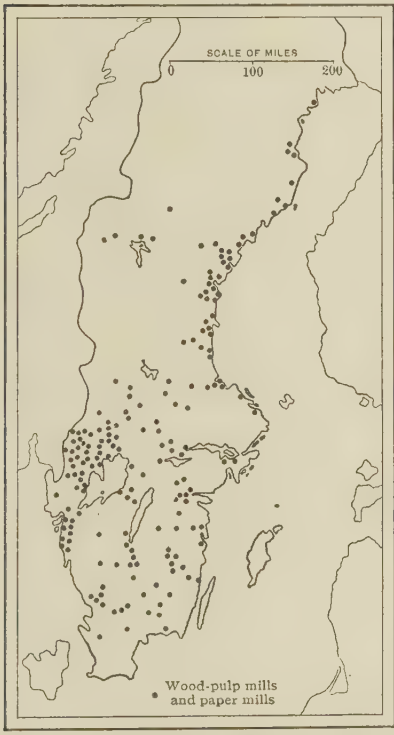

FIG. 272. Wood-pulp mills and paper mills in Sweden.

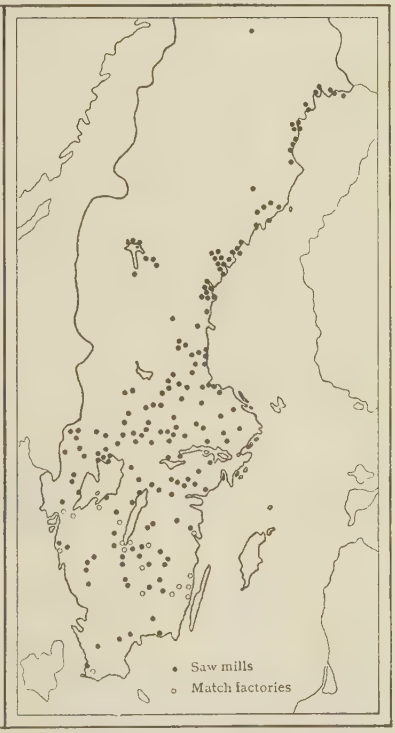

FIG. 273. Large saw mills and match factories in Sweden.

Cities; Commerce. — Stockholm, the capital of Sweden, is a beautiful city almost as large as Washington. While only 30 per cent of the Swedish people live in cities, 50 per cent are engaged in occupations other than farming. The exports are mainly the surplus products of forests, farms, and iron mines, and go most largely to Germany and Great Britain. Southern Sweden is excellently supplied with railroads, one third of which belong to the government; and lakes, rivers, and canals form a network of waterways for boats of moderate size.

Denmark

The present kingdom of Denmark is only a remnant of a once larger and more influential nation. At times in the past Denmark has been one of the leading powers of the Baltic region, and it still occupies an exceedingly strategic position, for it controls the ocean route between the North and Baltic seas. It is probable that some of the more powerful nations of Europe have considered it wise to maintain Denmark as a weak but independent state in possession of this important waterway.

The present area of Denmark is about one third that of a state like New York or Alabama, and its population is less than a third that of New York. Its dependencies — Greenland and the Faroe Islands — are of little commercial value.

Nature Has Done Little for Denmark. — Denmark is a land of low hills and sandy plains, with no point in the kingdom so high above the sea as the top of the Woolworth building in New York. The peninsula of Jutland forms two thirds of the land area, but has fewer people than live on the islands. Copenhagen, the capital, chief port, and only large city, is situated on the easternmost island; it is about the size of Buffalo. In natural resources Denmark is one of the poorest countries in Europe; it has no coal, iron, or any other mineral except clay. The forests are nearly all cleared off, and the soil is naturally poor. It may, therefore, cause some surprise when we learn that there is less poverty and a higher degree of general comfort and well-being in Denmark than in almost any other country of Europe.

Dairying and Agriculture. — Throughout their entire history, the Danes have been a people of energy and resourcefulness. Their sandy country offered them little except what they could wring from it by intelligence and hard work, and during the past generation they have worked out a plan that has kept a

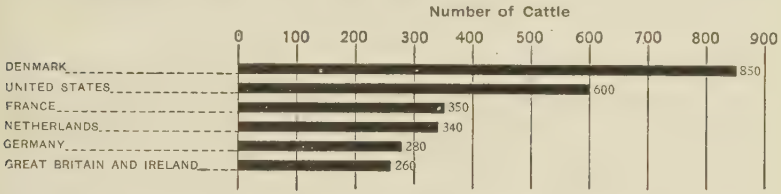

FIG. 274. Number of cattle per thousand of population in selected countries.

golden current flowing into their country. In the United States one person in nine has a savings bank account; in Denmark half the people have such accounts. Denmark has more money in savings banks than Belgium with over twice the population, or the Japanese Empire with over twenty times the population.

Although the soil is poor, it has been wonderfully improved by the intelligent methods of farming used by the Danish farmers. The land is nearly all divided into little farms of a few acres, owned by the farmers themselves. The Danes reasoned that the great cities in the neighboring countries — especially in England — would buy and pay good prices for

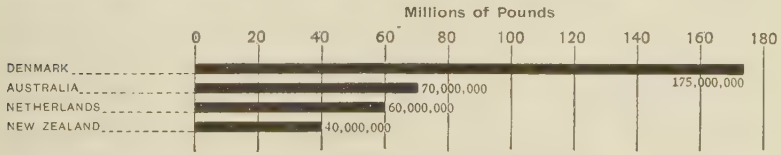

FIG. 275. Approximate annual butter exports of the leading exporting countries.

particularly choice provisions; and so they determined to make a specialty of butter, eggs, and bacon; not ordinary butter, eggs, and bacon, but distinctly superior products. They organized coöperative creameries and coöperative societies for handling, inspecting, and certifying their products, and also for

buying the feeds and supplies that they needed. Soon Danish bacon and butter were being exported to England at fancy prices. The dairy, swine, and poultry industries grew until the whole nation became prosperous. It was a triumph of intelligence, industry, and coöperation. In a favorable year, Denmark exports 200,000,000 pounds of bacon and hams, 175,000,000 pounds of butter, and 40,000,000 dozen eggs.

Other Industries. — Coal and most raw materials for manufacturing must be imported, and this so seriously handicaps industry that the Danes cannot compete with the great industrial nations like England and Germany; therefore manufacturing is a secondary industry. The Danes have always been a seafaring nation. While they are far below Norway and the Netherlands in this particular, they still have a merchant fleet of considerable size.

Exercise

Comparisons. — 1. Using the table, pages 583–584, determine how Norway and Sweden compare in size; in population; in exports.

2. Compare the latitude of Christiania with that of your own home.

3. Compare and contrast Norway and Sweden as agricultural countries; account for the difference.

4. Compare and contrast the two countries in (*a*) mineral resources; (*b*) forest resources.

5. Compare the topography of Norway and of Denmark and show why one has more water power than the other.

6. Compare the three Scandinavian countries with respect to the principal industry in each. Account for the difference.

7. Compare Norway and Sweden with respect to the development of manufacturing. Account for the difference.

8. The Norwegians have a larger merchant fleet than the Swedes. Account for this.

9. Norway has relatively few dairy cattle, but Denmark has many What reasons do you see for this difference?

10. Fishing is a much more important occupation among the Norwegians than among either the Swedes or Danes. How do you account for this fact?

CHAPTER XXIV

FINLAND, THE BALTIC STATES, AND POLAND

Finland

The Country and the People. — During a period of about 500 years, Finland was ruled by Sweden, and many Swedes settled in the country. Some of them intermarried with the Finns, who are in part descended from a branch of the Mongolian race. Many of the leading families are Swedish or have Swedish blood in their veins. Later, Finland was ruled by Russia for over 100 years. There are about as many people as in Denmark, and five sixths of them live in the country districts; they are distinctively a rural folk. Helsingfors, the capital, is a modern city of about 200,000 people, and maintains an excellent university with 4000 students.

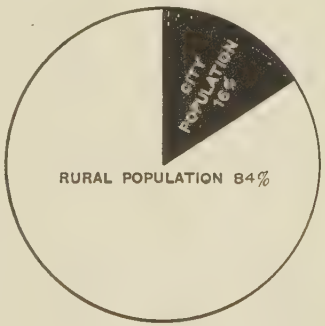

Fig. 276. Percentage of city and rural population in Finland.

Although the country is larger than Italy, it has a very small proportion of productive land. There are thousands of glacial lakes and swamps; in fact, the word Finland means fen-land or swamp-land. The winters are long and bitterly cold; only the hardiest crops are grown, and they occupy only 5 or 6 per cent of the land. Forests and brush cover the greater part of the country back from the coastal strip, where the majority of the people live. Yet, in spite of these handicaps, the Finns have made far greater progress than their neighbors of northern Russia. Travelers comment upon the immediate signs of enterprise and progress which appear as soon as they cross the boundary from Russia into Finland.

Resources and Industries. — Finland is far from being a rich country; it has little mineral wealth, and only modest agricultural wealth. The forests have a large stand of the soft woods (conifers) suitable for lumber and paper pulp, but it is difficult to get the wood from the interior to the coast. Two thirds of the people are engaged in farming and dairying. The latter industry has made notable progress during recent years, and Finnish butter is of considerable importance in the north European markets. There is no coal, but the country has abundant water power, only about 10 per cent of which is yet developed. Over half of this is employed in paper and pulp manufacture, one of the leading industries of the country. Manufacturing has made some progress, yet only one eighth of the people are engaged in it. Wood products are by far the most important, and are likely to remain so, for Finland's forests are her greatest source of natural wealth, and they supply from 70 to 80 per cent of her exports.

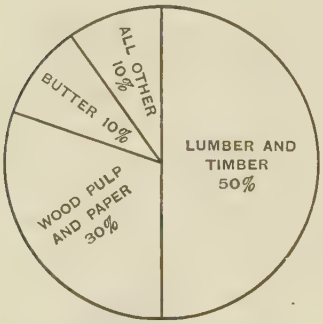

FIG. 277. Exports of Finland expressed in percentages of the total value of the country's exports.

The Future. — Finland is situated far to the north, and not in the part of Europe that is likely to be coveted by the land-seeking nations. Neither Sweden nor the present Russia now opposes the complete independence of the country. The laboring people are not satisfied with the present land system, which leaves much of the land in large estates. The country can produce only a part of its needed food and raw materials, and must trade freely with other countries if it is to attain the prosperity that seems likely, for there are able men among the Finns.

THE BALTIC STATES

Esthonia, Latvia, and Lithuania. — With the break-up of Russia, which enabled Finland and Poland to reëstablish themselves as independent na-

tions, there came also the establishment of the three small republics — Esthonia, Latvia, and Lithuania. They all border on the Baltic; each is occupied by a people with a language of its own, but all were misruled by Russia for a considerable period.

The people of Esthonia are kindred of the Finns, and speak a similar Mongolian language. The Letts of Latvia are Caucasians, but are not members of the Slav race nor are they like any of the neighboring people. The Lithuanians are still different — tall, light-haired, and fair. All these peoples have been oppressed by the Russian officials and by the German barons who have long held the great landed estates, especially in Latvia and Esthonia. Lithuania — at one time joined with Poland, and at another period herself a strong nation — has dwindled to a fraction of her former size. All three of these Baltic states are poor and weak. The people are mainly peasant farmers, the majority of whom have little education or experience in government. The countries are partly forest-covered, and contain large areas of swamps and shallow lakes. The soil is none too good; farming methods are crude; roads are few and poor, and the common people have a constant struggle to maintain even a decent living. The crops, like those of Russia and Poland, are cereals, potatoes, vegetables, and flax. The people have little to sell and hence little money with which to buy. Russia has acknowledged their independence, and they are trying to maintain independent governments. Riga in Latvia is one of the more important Baltic ports, and is an outlet for a large part of Russia.

Poland

Old Poland and its Dismemberment. — For centuries Poland was one of the great nations of Europe. At one period Poland and Lithuania were united, and their territory extended from the Baltic almost to the Black Sea and formed the second largest national domain in Europe; it was nearly three times the present area of Poland. But the country had hardly any natural boundaries; it lay in the heart of the great European plain, its boundaries were often changed, and large numbers of non-Poles were included within the Polish domain. There was an aristocratic ruling class that held large landed estates, and there was a numerous peasant population, but the substantial middle class which is necessary to make a strong nation was lacking. Internal quarrels were frequent, and in 1772 a series of partitionings began which resulted in the complete effacement of independent Poland (in 1795), and the annexation of its territory to Russia, Prussia, and Austria, Russia getting the largest amount. For a century

and a quarter the Poles were subjected to foreign domination; many emigrated to surrounding countries, and large numbers came to America. On the other hand, people from surrounding lands filtered into Polish territory, and the mixture of races went on; but the spirit of the Polish race continued, and they awaited the time when they might again become a nation. This opportunity came at the end of the World War in 1918, when, with the assistance of the Allies, Poland again became an independent nation, serving as a buffer state between Russia and Germany.

The New Poland. — Owing to the mixture of races, it has been found most difficult to establish anything like satisfactory boundaries for the new Poland. Within the new boundaries are included large numbers of Germans, Lithuanians, Russians, Ruthenians, and others, who can scarcely be expected to be satisfied with Polish rule; and elsewhere considerable numbers of Poles are left outside the limits of the new republic. A so-called "corridor" to the north gives Poland access to the Baltic Sea, but the chief port, Danzig, with a small adjacent territory, forms a "free state." The Polish corridor completely separates East Prussia from the rest of Germany (Fig. 210). In area and population Poland is about three fourths the size of France. Only five countries in Europe have a larger population. The area of Poland is nearly equal to that of North and South Dakota (Fig. 286).

Fig. 278. Use of the land in Poland.

Agriculture the Leading Industry. — Poland is a country of rolling plains, marshes, and forests. The soil is generally good and some is excellent. The climate is continental, with hot summers and cold winters, with sufficient rainfall for crops, and a heavy snow covering in winter. Half of the land is under cultivation, and produces good yields of cereals, potatoes, and sugar beets. Poland ranks second only to Germany in the quantity of potatoes raised, and is one of the large sugar-beet

growers of Europe. As in Germany and Russia, rye is the chief cereal. The majority of the people are engaged in farming, and under normal conditions the country can raise nearly if not fully as much food as its people require. If the farming were conducted as scientifically as it is in Germany, the country would have a surplus of foodstuffs for export. On the whole, Poland

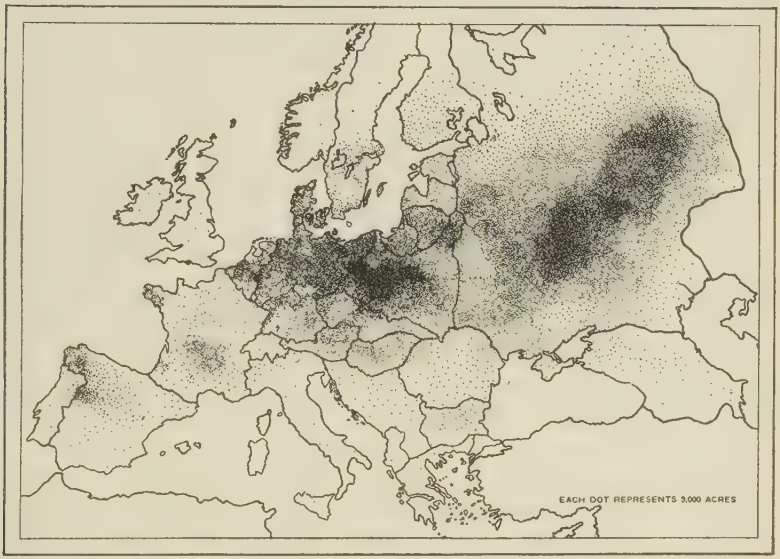

Fig. 279. Rye-producing regions. (*U. S. Dept. Agr.*)

must be regarded as one of the leading agricultural countries of Europe, and its future is closely bound up with agriculture.

Large Forest Resources. — Poland has some of the largest forest areas of Central Europe, covering upwards of 30,000 square miles, or over 20 per cent of the total area of the country; they supply the farmers and villagers with firewood, give the country most of the lumber and paper pulp that it requires, and leave a surplus of wood products for export. In this particular, Poland is self-sufficient, which is not true of many of the leading nations of Europe.

Large Mineral Wealth. — The new boundaries of Poland include one of the richest parts of Europe from the standpoint of minerals, and give it a basis for manufacturing scarcely surpassed in any country of Europe, for the minerals include five that are of fundamental importance: coal, petroleum, zinc, lead, and salt. All of these are found in the southern part of the country, and especially in the parts that were taken from Austria and Germany. In Poland are the largest zinc mines of Europe, the second largest lead mines, the third largest petroleum field, one of the leading coal fields, the largest known salt beds of the world, and iron deposits of value. Plainly, Poland is excellently supplied, so far as mineral resources are concerned, and minerals are of tremendous significance in this industrial age.

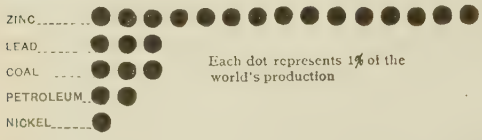

FIG. 280. The chief mineral products of Poland.

Development of Manufacturing. — In the part of Poland held by Germany and in the western part of Russian Poland, manufacturing had grown to large importance before the World War. The mineral wealth of the region, the large population from which to draw laborers, the German influence, and other factors had caused this part of Europe to become a hive of industry. The city of Lodz has so many cotton mills that it received the title, "the Manchester of Poland." This city and Warsaw are two of the textile centers of Europe. Poland is also one of the three great beet-sugar districts of the world. The metal industries and wood industries of Russian Poland were among the most important in Russia. It is clear that, from the standpoint of manufacturing, Poland has already made notable progress.

The Future of Poland. — From the foregoing paragraphs, it may be seen that Poland is a richly endowed country, rich in agricultural land, in forests, and in minerals; well developed in manufacturing, and peopled with a relatively dense population. But it has four serious difficulties to be met: (1) extremely unsatisfactory boundaries; (2) a mixed population that does not

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FIG. 281. Interior of a salt mine in Poland.

work harmoniously together, and thus weakens the government; (3) a dangerous position between two powerful peoples — the Germans and the Russians; and (4) great need of capital to restore the appalling destruction of property wrought by the invading armies between 1914 and 1920, and to build up again the industries of the country.

EXERCISE

It is suggested that members of the class prepare about fifteen questions on the foregoing chapter, and that one of the best sets of questions be used for reviewing the chapter.

CHAPTER XXV

SOUTHEASTERN EUROPE

Austria and Hungary

Austria-Hungary Prior to 1914. — The dual Monarchy of Austria-Hungary, ruled by the ancient family of the Hapsburgs, was made up of ten or more different peoples, all more or less unfriendly. It was politically discordant, but it formed an economic unit; the different parts of the monarchy produced things that the other parts needed. Austria and Bohemia had coal and iron, and had built up extensive manufacturing industries. Hungary, which included large areas of fertile plains, produced large quantities of wheat, corn, and other foodstuffs. The mountainous parts yielded lumber and pulp wood. On the whole, the country was remarkably self-sufficient; but the political and racial tangle made unity impossible, and now the territory of former Austria-Hungary is divided among six different nations (Fig. 282).

Fig. 282. Division of Austria-Hungary in 1919.

Austria. — The present republic of Austria is only a small fragment of the old Austria; its present land area is about 30,000 square miles and its population about 6,000,000. The beautiful capital, Vienna, one of the finest and largest in Europe, cannot possibly be maintained by the present small

nation of Austria. Most of the coal and iron of the old empire, all of its petroleum, many of its manufacturing centers, and its extensive beet-sugar lands were lost when Czechoslovakia and Galicia on the north were taken away (Fig. 282). The rich farm lands of the Hungarian plains, from which the greater part of the foodstuffs for the manufacturing cities came, are now in a foreign country.

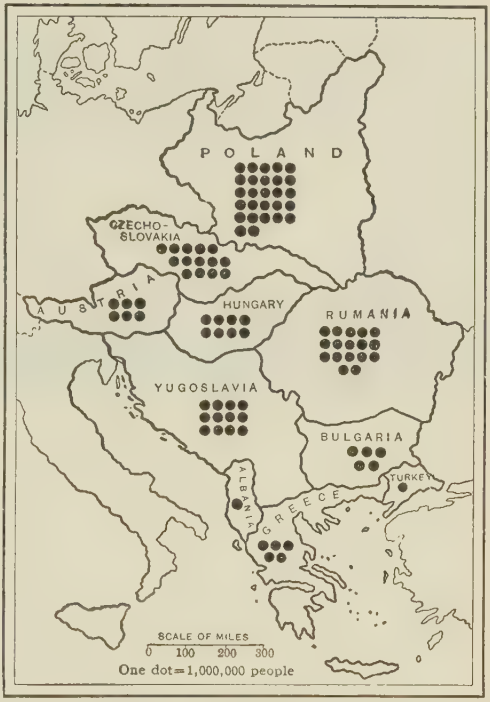

FIG. 283. Population of the countries of southeastern Europe. Each dot represents 1,000,000 people.

Hungary. — The Hungarians, or Magyars, are descended, not from Caucasian ancestors, but from a branch of the yellow race that forced its way into Europe from Asia more than a thousand years ago. They have become thoroughly Europeanized, and by intermarriage and contact with surrounding peoples have lost almost all of the characteristics of the ancient yellow race.

The present Hungary has only a third of the area and population of pre-war Hungary. The largest loss of territory came with the annexation of the eastern half by Rumania. Hungary is seeking to maintain a national existence, and for this struggle is somewhat better equipped than Austria, for the majority of the Hungarians live on farms and are able at least to produce enough

Fig. 284. The Danube and a part of Budapest, the capital and chief industrial city of Hungary.

food to feed themselves. Budapest, the capital, is a large, fine city on both banks of the Danube; it was and is the chief manufacturing city of Hungary.

Hungary was poor in minerals, and in its present reduced state is still poorer. It has very little coal or iron, and cannot, therefore, make much progress in manufacturing. Before the World War it was the leader among the European countries in the growing of corn, or maize, as it is usually called in Europe. The present Hungary includes almost nothing except the central plains, which are occupied solidly by Hungarians, and the outer borders of even this plains region have been annexed to adjoining countries. Neither Austria nor Hungary touches the sea, and their only water route to the sea is by the Danube.

Czechoslovakia

The Country and the People. — The present long and narrow land of the Czechoslovaks is set off on nearly all sides by natural boundaries. It has an area and a population nearly equal to those

of New York and New Jersey together. Bohemia, the chief part of Czechoslovakia, is a low plateau bounded on three sides by rather steep and distinct mountain slopes. Moravia, the middle of the three main provinces, includes the famous Moravian Gate, a broad depression west of the massive wall of the Carpathian Mountains. It is the chief north-south corridor of Middle Europe, and is an important trade route. Slovakia, the homeland of the Slovaks, lies on the southern slope of the Carpathians; it is a rough and rugged land, and the people — mostly peasant farmers — are less progressive than those of Bohemia and Moravia.

Czechoslovakia occupies about the most central position in Europe, and is the meeting ground of many peoples and of many trade routes. Its own people are Slavs — referred to as *West Slavs* to distinguish them from other branches of the Slav race. Within the borders of Bohemia are 3,000,000 Germans, now a subject people, in contrast with former conditions when the Slavs were the subject people and the Germans the rulers. In all, one third of the people belong to other nationalities than Czechoslovaks. The Czechs or Bohemians are an able people; situated between the Germans and German Austrians, they have borrowed much of the best in German culture and in German industrial methods. Prague, the capital, is one of the intellectual and industrial centers of Middle Europe.

A Country of Large Resources. — Czechoslovakia is a well-endowed country; 90 per cent of Bohemia is agricultural land, a very high proportion, indeed. The new republic has large deposits of coal, some of it of coking quality, and hence suited to the important service of smelting the iron ore which the country also produces. Lead, silver, nickel, and tungsten are all mined in sufficient quantities to aid the industries of the country. Moravia is a good agricultural region, and the rugged portions of the country are well forested. Both the Danube and the Elbe rivers are navigable, and are internationalized by treaty, so that Czechoslovakia has free use of them. Important railroad lines from many directions enter the country and give it

good trade connections with all its neighbors. In its geographical situation, its agricultural lands, its mineral and forest wealth, its communications by rail and river, and in the general character of its people, Czechoslovakia is a more favored land than any other of the existing parts of the old Austro-Hungarian monarchy.

Well-Developed Manufacturing Industries. — The coal, iron, and other minerals, the central location and good transportation

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FIG. 285. Iron works in Bohemia, which is one of the advanced countries of Europe in many phases of manufacturing.

facilities, the nearness to Germany and German Austria with their manufacturing industries, and the general ability and energy of the people, all combine to make Bohemia a land of mills and factories. In Bohemia over 40 per cent of the people are engaged in manufacturing. The beet sugar mills, breweries, glass factories, metal-working plants, textile mills, and leather tanneries are among the largest in Middle Europe. It is evident that Czechoslovakia is a well-balanced state from the standpoint of its varied resources, industries, and occupations, and its public debt is small. It has made a good start; its statesmen appear to be prudent, and on the whole the country seems to have a promising future.

Rumania

The Country. — Rumania gradually threw off Turkish rule after 1822, and became entirely independent in 1878. By treaties of peace following the World War, the country gained additional territory from Austria, Hungary, and Russia, and more than doubled its former area. The country is now the largest and most populous in southeastern Europe, not including Russia, of course. A large part of the land lies in the rich alluvial plain of the lower Danube and its branches, and is excellent agricultural land. Another large area is included in the Carpathian Mountains and has valuable forests. On account of the size of Rumania and its large area of level land, it is the most productive country in the Danube-Balkan region, and is fitted to become a large producer of foodstuffs for export. Under a progressive government and continued peace, Rumania, with a population of over 17,000,000, should become a nation of considerable importance. The Rumanians claim to be descended from Roman colonists, and are very proud of their ancestry. Their language is derived from the Latin. Bucharest, the capital, is a city of over 300,000.

FIG. 286. Central European countries compared in area and latitude with Minnesota and the Dakotas.

Products. — Rumania's chief resources lie in her agricultural lands and her extensive forests, but the country also has productive petroleum fields (Fig. 105). Other minerals are not produced in large quantities, though there are deposits of coal, iron, and salt.

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FIG. 287. Grain-threshing scene in Rumania. Note that women as well as men engage in the work. Rumania is one of the important cereal-growing countries of Europe.

Rumania is one of the three leading corn-growing countries of Europe, and is also a large producer of wheat. The future wealth and prosperity of the country lie in the production and exportation of grain. Fully 80 per cent of the people are engaged in agriculture; manufacturing has made little progress.

The Balkan Nations

South of the lower Danube and its branch, the Save, is an intricate maze of mountain chains and isolated valleys which constitute the Balkan Peninsula. This is one of the most mountainous sections of Europe; so badly is the country cut up by rugged mountain chains and deep valleys that the people have been kept in a backward condition. Railroads and good roads are difficult to build and to maintain, and consequently are scarce. It is difficult to penetrate the remote interior sections, and free intercourse among the various peoples is constantly hindered. All this has prevented the blending of the Balkan peoples, has intensified racial quarrels, and has made wars easy to start. For centuries the Balkan people were under the oppressive and blighting rule of Turkey, and no people ever made progress under Turkish rule. During the nineteenth century, Turkish authority was gradually overthrown and several small independent nations were established: Greece, Montenegro, Serbia, Rumania, and Bulgaria. Rumania is mostly north of the Danube and is not — strictly speaking — one of the Balkan countries, though sometimes it is so regarded.

The Balkan Peoples. — The Balkan Peninsula, owing to its geographical situation and its mountainous topography, has received and held a great mixture of peoples: Greeks, Turks, Bulgarians, Rumanians, Serbs, Albanians, Hungarians, Germans, Gypsies, and others. Among these peoples the Slavs (Serbs, most of the Bulgarians, and some others) are the most numerous group, but there is much mixture of blood, and the various groups of Slavs are by no means friendly. In every one of the countries, a considerable percentage of the people belong to alien nationalities. No national boundaries could possibly be drawn that would not place large numbers of people under the government of nations in which they are un-

willing to be included. The mountainous topography of the peninsula tends to keep alive old hatreds and to prevent the formation of unified nations.

The Predominance of Agricultural and Forest Industries. — In the Balkans, as elsewhere, mountainous lands are usually forested if the rainfall is sufficient; and rainfall is fairly abundant in this part of Europe. The valley lands are cleared and are used for pasturage, meadows, or plowed fields. Less than 25 per cent of the land of the Balkan Peninsula can be cultivated. The great majority of the people are peasant farmers who occupy small farms and cultivate them by crude and inefficient methods. Cattle, sheep, hogs, and goats in large numbers are raised, and they or their products make up one of the chief exports. The scarcity of roads and railroads makes transportation difficult and in many districts prevents the profitable production of surplus crops. Here again the topography works to the disadvantage of the people, and tends to keep large numbers poor and backward, for general education is impossible under such conditions.

Yugoslavia. — "The Kingdom of the Serbs, Croats, and Slovenes" is the official name of Yugoslavia. It is built around Serbia, which became independent in 1878, and centuries ago, before the Turkish domination, had been a country of considerable importance. After the World War the nation of the Yugo-Slavs (South Slavs) was formed by uniting Serbia, Montenegro, and the southern parts of Austria-Hungary into the new kingdom. Both Italy and Yugoslavia greatly desired to control Fiume, one of the chief ports on the Adriatic Sea; first it was made a "free city" but later was annexed to Italy, although the Yugo-Slavs retain the use of part of the port.

So far as territory is concerned, Yugoslavia is a fair-sized country; it is half as large as Germany, but has less than a fourth as many people. The great majority of the Yugo-Slavs are peasant farmers and stock raisers. They are a sturdy, freedom-loving people, who make good soldiers. The capital, Belgrade, lies at the northern end of the only important north-south valley in the Balkans, that of the Morava River, which flows

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FIG. 288. Serbian women who cut grain with sickles. Much of the farm work in the Balkan countries is done by laborious hand methods. See Figure 289.

north, and of the Vardar, which flows south. The two river valleys unite at their heads and form the great through route followed by the railway that connects Paris, Berlin, and Vienna with Constantinople.

The country has considerable mineral wealth, but the actual extent of this is unknown, and relatively few minerals are mined. Manufacturing has scarcely made a beginning. The people have little to sell, and hence can import but few foreign goods; the exports amount to only $5 or $6 per capita a year, as compared with about $100 for countries like Switzerland and Belgium.

Bulgaria. — Bulgaria has had a turbulent and unhappy career since it escaped from Turkish rule (1878–1909). In alliance with Serbia and Greece it defeated Turkey in 1912–1913, but then quarreled with its allies and was quickly beaten. In the World War it took the side of Germany and was disastrously

defeated; it lost a portion of its territory, and has a heavy debt. It has lost its coast lands on the Aegean Sea, and lost hundreds of thousands of its men in the three recent wars in which it engaged.

As in the other parts of the Balkan Peninsula, much of Bulgaria is mountainous; about a third of the land, in small farms, is used for crops; stock raising and agriculture employ the greater part of the population. Mining is unimportant, and manufacturing has only made a beginning.

Albania. — Albania is the smallest and least important of the Balkan states. It was under Turkish rule until the war of 1912–1913, and was then made an independent state. The people are so independent that they are lawless. They resent control by any form of government; they go armed much of the time, shoot on small pretext, and live uncontrolled, adventurous lives. The country has no railroad and hardly any improved roads. The people produce little more than enough for their own needs and purchase very few imported goods. The only basis for the separate national existence of the Albanians is their intense racial spirit. The country is the hornet's nest of the Balkans.

Greece. — Greece was the first of the Balkan countries to throw off the Turkish yoke and obtain independence (1829). Since that date, the Greeks have engaged in several wars by means of which they have considerably extended their national boundaries. The modern Greeks are a much mixed race, but they are an energetic, spirited people. Large numbers come to the United States, where they usually succeed in business.

Greece has three geographical handicaps: (1) small size; (2) very mountainous topography; (3) scanty rainfall in summer. Agriculture is the chief occupation, but it is a specialized form of agriculture in which most of the work is done by hand, and is intensive in character. The outstanding crop and export is a kind of small grapes which are dried and sold in large quantities (300,000,000 pounds a year) under the name of currants. The United States imported $9,000,000 worth of these currants in a recent year. Olives and figs are extensively grown, and special kinds of tobacco are raised. Even the United States, the leading

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FIG. 289. Threshing out grain by hand, as in olden days, in Greece. For the modern method of threshing, see Figures 168, 287.

producer of tobacco, imports millions of dollars' worth of Greek tobacco annually.

The greatly indented coast line and the hundreds of islands have tended to make the Greeks the leading maritime people of the eastern Mediterranean. More progress in manufacturing has been made in Greece than in other Balkan countries, and mining operations of some importance are carried on.

Turkey. — Turkish territory in Europe consists of only a very small area, including Constantinople. The larger area in Asia is discussed briefly on pages 513–515.

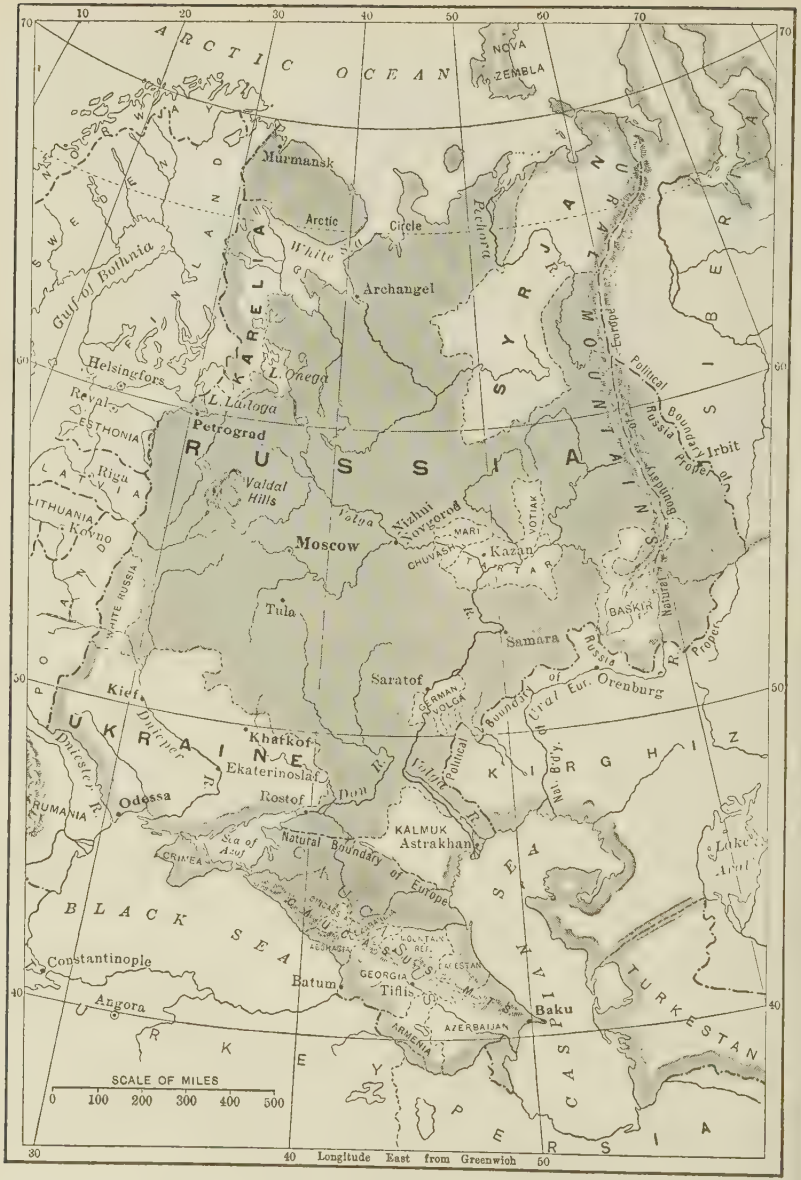

FIG. 290. Russia and adjacent lands.

CHAPTER XXVI

RUSSIA IN EUROPE AND IN ASIA

The Russian Revolution of 1917. — When the World War was at its height in 1917 people were startled by the news that the Russian government had been overthrown. The Czar was forced to abdicate and a new democratic government was set up. A few months later this new government was itself overthrown, and a communistic republic, or *Soviet Republic*, took its place. It was reported that the Czar and his family and thousands of the old ruling class were killed or driven into exile. The new government went to unbelievable extremes in overthrowing everything that had belonged to the old order. The world's history has few chapters more terrible than that which records the first years of this so-called Republic. Railroads rapidly became crippled or useless; factories soon were in hopeless disorganization; the Russian money was hardly worth the paper it was printed on; and political conditions bordered on complete anarchy. In 1921–1922 millions of people were facing starvation, and hundreds of thousands perished.

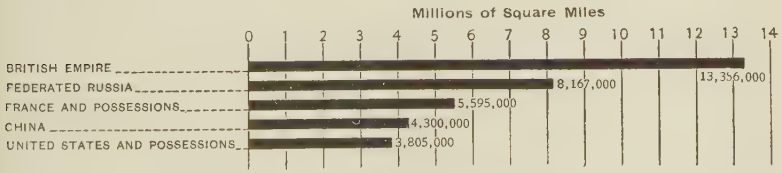

FIG. 291. Comparison of areas.

Parts Detached from Russia after the Revolution. — The old Russian government had held many peoples in subjection, and certain of these peoples promptly proceeded to separate themselves from the new republic. Nine different parts of the old

empire withdrew and set up independent governments. All together these new states took away less than a third of the territory of the old Russian Empire, but they included some of the very best and most populous parts, especially Poland and the Ukraine. The Ukraine, however, and some of the other states were soon brought again under Russian control; but Poland, the Baltic states, and Finland remained independent.

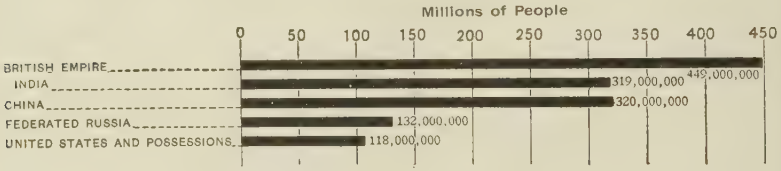

FIG. 292. Comparison of populations.

The Great Forest Belt of Russia. — The larger part of Russia lies in the northern belt of coniferous forests that stretches from Norway across Europe and Siberia to the Pacific — the largest continuous forest in the world. In the extreme north the climate is too severe for trees to grow, and *tundras* (frozen swamps) border the Arctic Ocean. In central European Russia the forests have been cleared and the land has been turned into farms. Russia has an enormous wealth of timber, but the greater part of it is in such remote regions, so far from world markets, and so far out of reach by any existing means of transportation, that a long time must elapse before the timber can be brought into use. It is the world's greatest timber reserve for the future.

Agriculture, the Principal Occupation. — Russia is a country of peasant farmers; fully 80 per cent of the people make their living from the land. The best land is in the Ukraine, in southwestern Russia. In the northern two thirds of the country the winters are bitterly cold, and in the east and southeast the rainfall is scanty; yet the amount of level, productive land is very large, and before the World War Russia had become one of the world's greatest producers of wheat, barley, rye, flax fiber (Fig. 293), oats, potatoes, and sugar beets.

FIG. 293. The world's flax-producing regions. (*U. S. Dept. Agr.*)

Farming methods are crude, and the production of crops per acre averages low; but the extent of agricultural land is so great that an enormous amount of produce can be raised. Russia

FIG. 294. Russia's percentage of the world's production of selected commodities before 1914.

was, and probably will again be, a leading source of foodstuffs for the manufacturing nations of western Europe.

Poor Roads and Insufficient Railroads. — Most of the vast Russian plain is deeply covered with soil. Rocks outcrop scarcely anywhere, and road-building materials are scarce. Moreover, the Russian government made little effort to provide good roads, and the greater part of the farms are far from railroads. Poor transportation always retards a country's progress, and Russia suffers more in this respect than almost any other

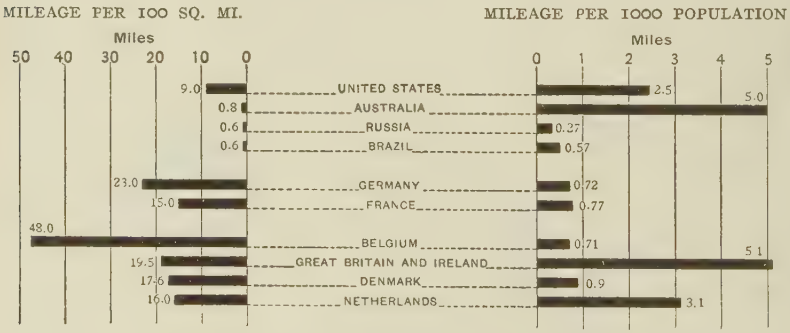

FIG. 295. Railroad statistics for selected countries.

nation in Europe. The Volga and a few other rivers are navigable, and canals connect certain rivers. Normally, these waterways are much used and are of great benefit to the country.

The Mineral Wealth of Russia. — In proportion to its area, Russia has never been a great mineral-producing country, although it has a great deal of mineral wealth.

Petroleum. In the vicinity of Baku, on the Caspian Sea, is one of the world's great oil fields, which at one time produced more petroleum than the entire United States. During the World War and afterward the production fell off, and Russia dropped to

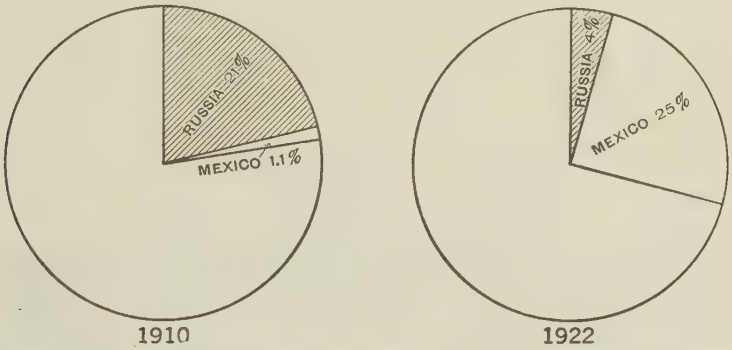

FIG. 296. Percentages of the world's petroleum produced by Russia and Mexico.

third place in oil production, being surpassed by Mexico, and greatly surpassed by the United States.

Coal and iron. Russia has one of the highest grade iron ore bodies in Europe; it is in the Ukraine. The principal coal fields of Russia are in the same region.

Platinum. In the Ural Mountains is the chief source of the world's platinum, one of the most rare and valuable minerals. It is so essential for many chemical and other scientific uses that its value per ounce is much higher than that of gold. The only other place in the world where any important amount is found is in Colombia in South America (page 300), which during the years around 1923 produced more than Russia.

Other minerals. Russia was formerly the foremost producer of *manganese*, yielding over 50 per cent of the total supply of the world; it came mainly from the Caucasus Mountains. Manganese is essential in making steel by either the Bessemer

or the open-hearth method. On an average, fourteen pounds of manganese are used for each ton of steel made by these methods. Siberia has considerable *gold*, and under pre-war conditions Russia ranked about fourth in the output of this metal. In a realm of such vast extent and diversity as Russia, great mineral wealth is almost sure to exist, but in a country so backward as Russia the minerals are slow in becoming known.

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FIG. 297. Bell market in the old days at the great Russian fair in Nizhni Novgorod.

The Importance of Fairs. — For a long time fairs were a chief means of bringing sellers and buyers together in many parts of Europe. Some of the fairs were of great size, and attracted people from hundreds of miles away. With improvement in means of transportation and with the growth of permanent commercial centers, fairs declined in importance in western Europe; but in Russia, where the change came much more slowly, fairs continued to be an important means of merchandising. Before the break-up of Russia in 1917, more than 1600 such fairs were held annually in various

parts of that country. The largest and most famous was held at Nizhni Novgorod, in central Russia. Almost every conceivable object or commodity which one had to sell or barter was taken to these fairs, where it was sold or, more likely, was traded for something else. A great fur fair was held yearly at Irbit in the fur-producing region of north Russia. Many other products besides furs were bought and sold at the Irbit fair, and the turnover at times reached over $30,000,000 a year. As many as 5000 horse fairs were held annually throughout Russia, which has always been a country of horses. Along the edge of the great forest and on the banks of rivers which could float the timber, were held the lumber and timber fairs. Some of the Russian fairs still continue, but they no longer hold their old place of importance in the commercial life of the country.

Russia's Lack of Ice-Free Ports on the Open Sea. — The old Russian Empire included within its borders about one seventh of the land of the earth. It stretched in a continuous block almost halfway around the world, yet it had not one first-class harbor on the open sea. One or two ports in the north of European Russia are open all the year, but they are far from the important commercial routes, and far from the heart of Russia. The Baltic Sea ports are closed by ice a part of the year; and, moreover, foreign powers control the entrance to the Baltic. There are good ports on the Black Sea, but again the entrance to that sea is controlled by a foreign power. In the Far East, the port of Vladivostok on the Pacific is kept open with great difficulty during the winter.

Backwardness in Manufacturing. — Old Russia made notable progress in manufacturing during the fifteen or twenty years preceding the World War, but it was far from self-sufficient in that respect. During the war, when Russia was fighting on the side of the Allies, it had to buy huge quantities of clothing, munitions, machinery, shoes, and all other manufactured goods in the United States, Japan, England, or anywhere else that they could be obtained. After the Russian Revolution (1917) conditions became still worse, and for years the manufacturing industries were in a deplorable condition. Nearly 80 per cent of the Russian people are illiterate, or were a few years

ago, and such a condition, of course, works against the upbuilding of manufacturing or of any other form of industry where some education on the part of workmen is necessary. The chief centers of manufacturing were in Poland, the Ukraine, and in a few cities of Russia proper, especially Petrograd and Moscow, the present capital city.

The Foreign Commerce of Russia. — Even before 1914, the per capita foreign trade of Russia was small, but this was to be expected, for the mass of the people were poor, and they could buy few if any imported goods. Moreover, Russia was a country of vast size and great resources, and the various parts could supply most of the needs of the people; except that many manufactures were imported, in spite of the industrial progress of Russian cities. The policy of the old Russian government was to make Russia just as nearly self-sufficient as possible, and such a condition may operate strongly against the upbuilding of

FIG. 298. Wheat-producing regions of Europe and the Caucasus. (*U. S. Dept. Agr.*)

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FIG. 299. A modern concrete grain elevator (or public granary), at Samara, South Russia.

foreign trade. For a time after the revolution, most of the countries of the world were either unable or unwilling to continue trade relations with Russia; and for a time Russia had very little to sell; its foreign trade almost disappeared, but it is now returning.

The Ukraine. — In southwestern Russia is a large region called the Ukraine, occupied by a branch of the Slav race known as the *Ukrainians* or *Little Russians*. After the Russians regained control of the Ukraine, its government was changed to a soviet republic, similar to that of Russia proper. The Ukraine, moreover, is closely federated with Russia, as are various other less important parts of the former empire which are nominally separate soviet republics.

The Ukraine is the best part of Russia; its land is level and fertile, and 65 per cent of it is arable; its climate is mild and stimulating, and the rainfall seldom fails to meet the needs of the great crops of grain and sugar beets that are raised. This section produced about 40 per cent of the wheat, 50 per cent of the barley, and 80 per cent of the sugar beets of the old Russia. Moreover, it has the best coal fields and iron ore bodies in Russia, those of the Donetz basin, lying a little north of the Black Sea. Before the Russian Revolution, this mineral region supplied 70 per cent of the coal and 75 per cent of the iron ore mined in the entire country. The Ukraine

FIG. 300. Regions in Europe producing sugar beets. (*U. S. Dept. Agr.*)

has about 25 per cent of the railroad mileage of European Russia; and its ports on the Black Sea, especially Odessa, are the chief outlets for the great cereal lands of south Russia.

ASIATIC RUSSIA

Georgia, Azerbaijan, and Armenia. — In and near the Caucasus Mountains, between the Caspian and Black seas, are several distinct races of people who, in the past, were conquered by Russia and forced to accept Russian rule. After the overthrow of the old Russian government in 1917, three of these peoples set up the independent republics of Georgia, Azerbaijan, and Armenia. In Azerbaijan are located the great oil fields at Baku on the shore of the Caspian Sea (page 455).

When Russia regained control of these three small republics, their governments, like that of the Ukraine, were changed to soviet republics, closely federated with Russia.

Siberia. — *The Land and the People.* Of all the vast area that made up the old Russian Empire, nearly three fourths lies in Asia. Siberia alone is much larger than Europe, but contains only about as many people as New York state. Much of Siberia is so cold and the conditions of living are so hard that the native tribes multiply but slowly, and number only about 2,000,000 people in all. Some of them are fishermen and hunters like the

Eskimos of North America, and some keep herds of reindeer like the Lapps of northern Europe. The natives are, as a rule, very poor; they have little to sell and little with which to buy. Furs, ivory, and a few other things are bartered to traders. There are also about 9,000,000 Russians in Siberia, some of whom were sent as exiles from European Russia, but most of whom migrated there as agricultural colonists.

Agriculture. Since the building of the Siberian Railway, several million peasant farmers have gone into Siberia and settled near the railroad or along the great rivers that are crossed by it. Before the collapse of Russia, these farmers were fairly prosperous and were sending out considerable wheat, butter, eggs, and other farm products. The best farm lands and the majority of the farmers are in western Siberia, in the section that is near Europe. Fully two thirds of Siberia consists of mountains, tundras, swamps, and forests, yet an area several times as large as France is as good farm land as much of western Canada. The great drawback is the long distance to markets and the high cost of transportation.

Mineral Wealth. Gold has been mined in various parts of Siberia for many years, partly by the forced labor of exiles and convicts. The richest placer mines known anywhere are along the Lena River. It has been estimated that under favorable conditions Siberia could produce $6,000,000,000 in gold in thirty or forty years. Small quantities of iron, copper, and coal are mined. The mineral resources of Siberia have hardly been scratched, and very little is really known about them.

The Siberian Railway. — The Siberian railway was built across Siberia by the old Russian government between 1890 and 1904. It connects Petrograd and Moscow in Europe with Vladivostok on the Pacific coast; it is the longest continuous line in the world (about 5,500 miles), and for part of the way is double tracked. Before this road was built, Siberia produced very little that reached the outside world; there was little incentive to raise anything to export, for it could not be transported to markets. But with the building of the Siberian Railroad a marked change came; Russian farmers emigrated to Siberia; a dozen cities of 50,000 people or larger

grew up, and local trade — mainly by barter — became active; but this progress was halted by the chaotic conditions in Russia after 1917.

Russian Central Asia. — Kirghiz, Turkestan, and smaller Russian dependencies southwest of Siberia have all together an area half as large as the United States (Fig. 312). Lying in the interior of a large continent, these lands are predominantly dry. On the steppes the natives are nomads, keeping cattle, sheep, goats, and camels. Less than one third of the land can be used even for pasturage. The oases have cities of considerable size; Tashkent has 270,000 people and Samarkand 100,000. The region is traversed by the Trans-Caspian Railroad.

Commerce. — As a whole, the commerce of Asiatic Russia is small and is mostly carried on with other parts of Russia and with adjacent countries. The Russians are tea drinkers, and the overland tea trade with China has, in the past, been of considerable importance.

Gilliams Service

FIG. 301. Camels carrying wood for fuel over Russian steppes. Fuel is scarce in desert and semi-arid regions. The Russian steppes extend from southeastern Europe into Central Asia.

Summary

Prior to the Russian Revolution of 1917, the Russian Empire included about one seventh of the land surface of the globe. Of the 180,000,000 people in the empire, more than 150,000,000 lived in European Russia; 80 per cent of these were peasants, most of whom were poor and illiterate. The Czar's government was tyrannical, and during the World War it was overthrown; later a communistic republic was set up, and under it the country went rapidly downward. Parts of the old empire withdrew and set up governments of their own; some of them remained independent, while others were soon reunited with Russia.

Russia has the largest continuous forest belt in the world. It has a vast extent of level, fertile, agricultural land, well suited to cereal growing, and before the World War it was a large producer of foodstuffs for western Europe. The country's mineral wealth is large. European Russia is the only part that is passably well supplied with railroads. Good country roads scarcely exist. Fairs in great numbers — some of them of large size — were held throughout Russia, and an enormous volume of goods of all kinds changed hands. One of Russia's great handicaps was and still is the lack of good ports on the open sea. It does not possess a single harbor satisfactory in all respects. Manufacturing had made a fair start under the old empire, but was nearly destroyed in the early years of soviet rule. The foreign trade was never large, considering the size of the country, and for various reasons it nearly disappeared after 1917. The Ukraine is the most valuable part of Russia; it is rich in minerals, has a great extent of excellent agricultural land, good railway facilities, and large manufacturing cities. The vast area included in Siberia and Russian Central Asia is very sparsely inhabited and takes only a small part in the world's commerce.

Exercise

1. On which side did Russia fight in the World War?
2. When did the Russian Revolution take place?

3. What was the effect of the new form of government upon Russia?
4. What parts of Russia withdrew and set up independent governments?
5. From the map, Figure 290, fix in mind the location of the following:

White Sea	Nizhni Novgorod	Crimea
Archangel	Ukraine	Caucasus Mts.
Petrograd	Don River	Black Sea
Moscow	Ural Mts.	Caspian Sea
Volga River	Odessa	Baku

6. What port is Russia's only outlet on the Baltic Sea? (Fig. 290.)
7. Sweden has far smaller forest resources than Russia, yet exports more forest products: account for this.
8. Why, in your judgment, did fairs as a means of carrying on trade, continue longer in Russia than in western Europe? Where were two of the leading Russian fairs held?
9. Why are so large a percentage of the Russian people engaged in agriculture?
10. Why is the production of crops per acre low in Russia?
11. What is illiteracy? Why is illiteracy widely prevalent in Russia?
12. What part of Russia is best suited to agriculture?
13. Why are rivers used more generally for transporting products in Russia than in the United States?
14. In what parts of Russia was most of the manufacturing carried on? Why is manufacturing in a backward condition in most parts of Russia?
15. What effect does the absence of good roads have upon agriculture in Russia? Explain why.
16. Why is the loss of Russian Poland more serious to Russia than the loss of Finland?
17. Where are the platinum mines of Russia? Where is the principal coal and iron field? Petroleum field?
18. Why did Russia have very little foreign trade for several years following the revolution of 1917?
19. Why is it not necessary for a country of large and varied resources (such as Russia) to carry on extensive foreign trade?
20. What important food products does Russia raise in large quantities?
21. Why is Siberia sparsely populated?
22. What part of Siberia contains the greater number of the population?
23. Where is Lake Baikal? The Ob River? The Lena River? The Amur River? The city of Vladivostok?

CHAPTER XXVII

JAPAN

The Monsoon Lands. — Southeastern Asia, from India to Japan, has the monsoon type of climate. During summer in the northern hemisphere, the sun's rays fall with intensity upon the great land mass of Asia, and its southern and central portions become highly heated. The heat causes the air to expand and rise, thus producing a region of low atmospheric pressure toward which the air currents flow; hence in southeastern Asia the prevailing winds are from the sea during the summer. This period of about three months is the period of the *summer monsoon.* When these warm, moisture-laden winds blow across the lands, especially the highlands, and are cooled, abundant rain falls. Thus the period of summer heat is also the period of abundant rain, and ideal conditions for agriculture are brought about. The monsoon lands are thus capable of producing great quantities of food, and hence of supporting great populations; in fact, nearly half of the human race live in southeastern Asia and the near-by islands, and the vast majority of them live by agriculture.

In the winter the sun's vertical rays fall south of the equator, the continent of Asia becomes cooled, and the air currents reverse their direction and flow outward toward the sea. These winds blowing from the land, called the *winter monsoon*, are dry, and hence the monsoon lands receive very little precipitation in winter.

The monsoon type of climate is more pronounced in India than elsewhere, but it is also well developed in southern China and to a considerable degree in Japan. However, northern China and northern Japan come under the influence of the prevailing westerly winds a large part of the year.

Japan since 1854. — When Commodore Perry of the United States Navy in 1854 induced the Japanese to open their ports to foreign nations, that country knew practically nothing of western civilization. Since that date Japan has made the most rapid progress ever made by any people. A highly trained army, a strong navy, and a large merchant fleet have been built up; western methods of industry and commerce have been adopted with great rapidity; foreign trade has grown amazingly; and to-day Japan stands out as one of the leading powers of the world. The Japanese gained a quick military victory over China in 1895, and defeated Russia in 1905. These victories gave Japan a commanding position in Eastern Asia and soon led to the annexation of Korea (renamed Chosen), and to a large degree of control in Manchuria.

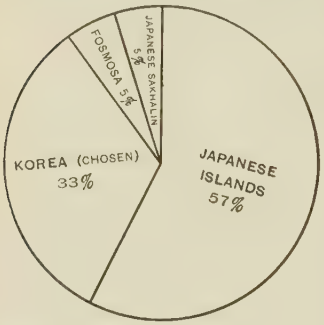


FIG. 302. Proportionate area of Japan and its dependencies.

The Present Struggle. — The Japanese population is increasing rapidly; with an average of 340 people to the square mile in the three main islands, the country is overpopulated, and can provide employment and insure food for its people only with great difficulty. Japan needs more land, more raw materials, markets for her manufactures, and eventually will need more coal. It is not surprising, therefore, if the Japanese are seeking to get control of some of the great resources of China, and possibly of the undeveloped lands of Siberia; yet encroachments in these countries are sure to bring trouble. Japan aspires to

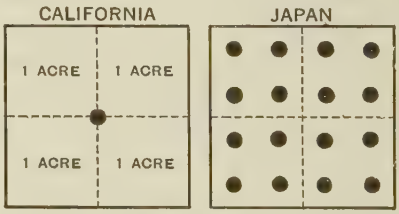


FIG. 303. Average number of persons supported from 4 acres of land in California (1), and in Japan (16).

take a part in the commercial world such as Great Britain has taken, and thus through manufacturing and commerce to provide employment for her people. Let us observe the points of advantage and of disadvantage in this struggle.

Points of Advantage

A Bracing Climate. — The main Japanese islands lie in the same latitude as the United States. Being surrounded by the sea, they have milder summers and milder winters than our interior states, yet the climate is bracing or at least not depressing. Neither summer nor winter is as extreme as it is in our North Central States. Thus in the eastern and southern parts the snowfall is light; but the winds bring abundance of rain, especially in the growing season. Temperature, rainfall, and the stimulating qualities in the climate are all favorable, and play a large part in making Japan an energetic nation.

A Good Commercial Position. — The geographical position of Japan is advantageous for carrying on trade with about half the population of the earth. Across a narrow sea live China's 320,000,000 people, and Japan is nearer than any other industrial nation to India with its 320,000,000. Japan's position for trade with Australia, New Zealand, and the East Indies is likewise favorable, and for trade with North America it is not unfavorable.

An Able and Energetic People. — The people of Japan are a remarkable race; energetic, industrious, alert, persistent, patriotic, imitative, quick to learn, and quick to seize an advantage; good soldiers and sailors, and skillful traders. These qualities have contributed greatly to the making of the new Japanese nation.

Mineral Wealth. — Japan is a mountainous and volcanic country, a condition which not uncommonly is favorable to the deposition of the metallic minerals. Japan is one of the copper-producing nations, and is a large exporter of this metal. Not only has the country coal for its own factories, railroads, and steamships, but it also exports coal, though not in great quanti-

ties. The country is fortunate in having at least a moderate quantity of petroleum, which has become one of the essentials of modern life. The possession of these and other minerals, including gold, silver, and lead, is an advantage, although the quantity of minerals possessed is inadequate for the country's future needs.

Points of Disadvantage

Small Size and Very Small Agricultural Area. — Japan proper is not quite so large as California; moreover, 75 per cent of the area is made of young, rugged mountains, with more than fifty active or recently extinct volcanoes. Earthquakes occur every day, but severe shocks are rare. Only about 15 or 16 per cent of the land of the islands is capable of cultivation. Chosen (Korea) is the size of Kansas, but less than half of it is tillable. The whole Empire of Japan and its possessions are only about as large as Texas, yet they have a greater population than any European country except Russia. All the land capable of producing food is less than that possessed by Iowa. The smallness of the area of food-producing land is Japan's most serious problem, and is the main cause for her ambition to secure additional territory on the mainland of Asia. It is true that Great Britain can produce only a small part of the food that her people need, but Great Britain has agricultural colonies of vast extent.

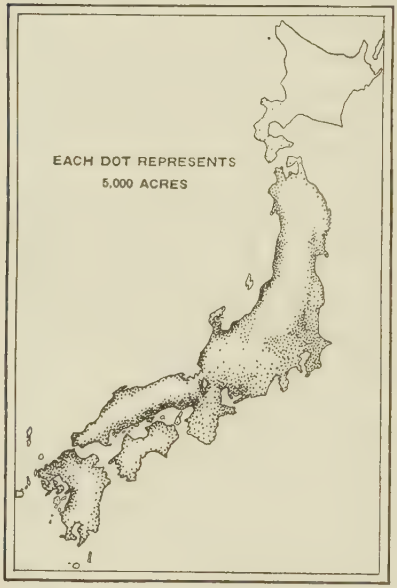


Fig. 304. Rice-producing regions of Japan. (*U. S. Dept. Agr.*)

Insufficient Iron for the Needs of a Manufacturing Nation. — A modern manufacturing nation needs iron in great quantities, but Japan produces very little; far too little for her needs. China has exceedingly rich iron deposits, and Japan desires to get control of at least part of them. Japan's second largest import from the distant United States is iron and steel products.

Industries and Commerce

Agriculture and Horticulture. — Nearly three fourths of Japan consists of forest-covered mountains, used neither for crops nor for pasturage, for the native upland grasses are not a suitable feed for animals. While only a minor part of the land is cultivated, it is cultivated with utmost intensiveness; two, three, and even four crops are raised on some of the land in one year. About 50 per cent of the people are farmers, but the farms — most of them owned by the farmers themselves — are small (Fig. 305). Over half the available land is used for a single crop — rice, the most important food crop of the Orient. The paddy (rice) fields as a rule are very small, many of them covering less than a tenth

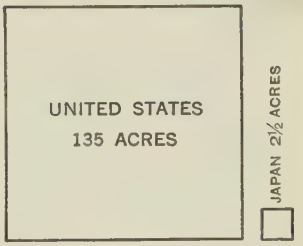


Fig. 305. Average size of farms in the United States and in Japan.

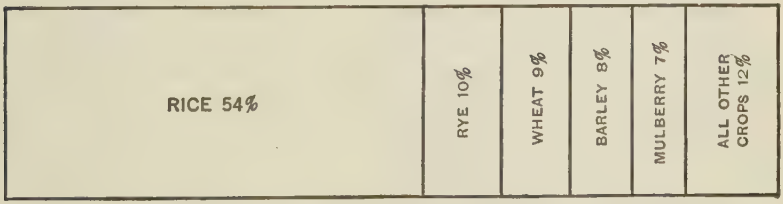
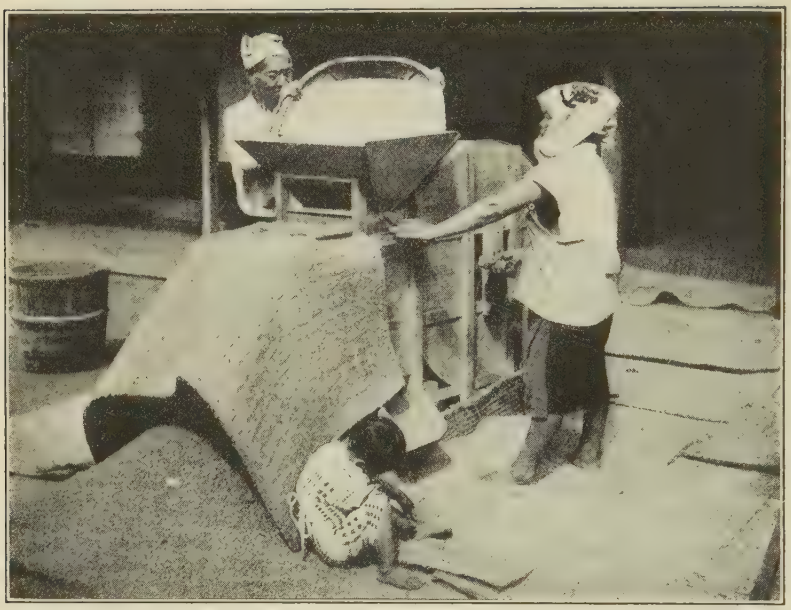


Fig. 306. Percentage of cultivated land in Japan devoted to chief crops.

of an acre. Next to rice, barley is the most-used grain, though rye and wheat are raised in nearly the same quantities as barley. Tea is not an important crop. Few farm animals are raised,



Keystone

FIG. 307. Separating chaff from rice, the characteristic food of the Orient.

for land is too much needed for raising human food to devote it to the raising of live stock; hence the Japanese use little meat.

Importance of the Silk Industry. — The greatest money crop of Japan is raw silk. One family in every six raises silkworms, and over a million acres are devoted to the mulberry tree, whose leaves, picked fresh daily, are fed to the worms.[1] Silk production is a domestic industry, carried on mainly by the women and girls in the homes. The silkworms are very sensitive and require painstaking care. They spin cocoons of silk around themselves, and from these the fine silken fiber is reeled into skeins of raw silk; it takes over 2500 silkworms to produce a pound of silk, and the annual crop exceeds 35,000,000 pounds. Nearly

[1] Though commonly called "silk worms," they are the larvae, or caterpillars, of the silk moth.

one half in value of all Japanese exports is silk and silk goods, and the greater part of these come to the United States. The dependence of so many Japanese upon the income from silk which is sold in the United States works for peace between the two nations. In 1920 a sudden drop in the price of silk caused a severe panic in Japan, and seriously affected the finances of the entire country. In fact Japan is almost as dependent upon the income from silk as Brazil is upon the income from coffee, but less dependent than Cuba is upon the income from sugar.

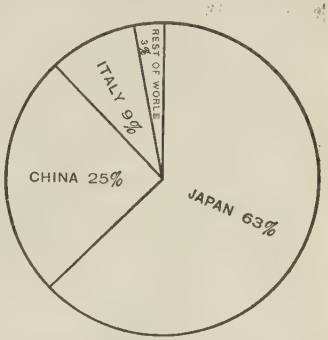


FIG. 308. Percentage of the world's raw silk produced by each country.

Fishing. — Japan has a very long coast line and excellent opportunities for fishing. Nearly a million people are engaged wholly or partly in this occupation, and fish constitutes an important item in the diet of the people. Japan is one of the four or five leading nations in the value and importance of her fisheries.

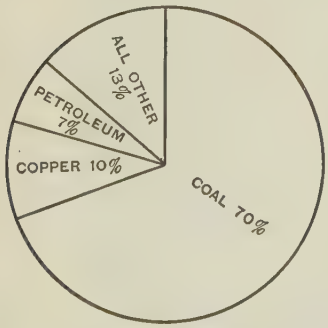


FIG. 309. Relative value of minerals produced in Japan.

Mining. — For so small a country, Japan is rich in minerals, except iron. The principal mineral products are mentioned on page 467.

Manufacturing. — Many of the Japanese are highly artistic, and become very skillful in the hand trades. They have turned to the making — both by hand and by machinery — of great quantities of articles such as toys, matches, fans, cigarettes, brushes of many kinds, silk and cotton fabrics, and pottery. Before the World War, labor was abundant and cheap

International Newsreel

FIG. 310. Aerial view of a steel ship under construction in the Asano shipyards in Yokohama, Japan. Japan is becoming one of the important shipbuilding nations.

(twenty or thirty cents a day), but wages rose rapidly during the war, and did not afterwards return to the pre-war level. The largest line of manufacturing is cotton goods, made chiefly from cotton grown in the United States and India; the second important line of manufacturing is iron and steel products, including shipbuilding; for this important industry most of the raw material also has to be imported, and the United States is the chief source. Japan is rapidly growing into a manufacturing nation, but the greater part of the raw materials must be imported, as is the case with Great Britain. Japan's future ability to support her large population and maintain herself will depend upon the increasing development of manufacturing; for this her people

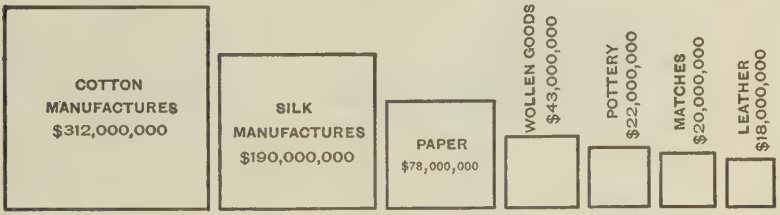


FIG. 311. Important manufactures of Japan — value of products in one year. Iron and steel products are also among the leaders.

are well fitted, and her geographical position is favorable, for nearly half the population of the world is at her door or not far away. Two great problems before the Japanese are (1) to provide an unfailing supply of basic raw materials — especially the fibers and the metals, — and (2) to secure a friendly market for an ever-increasing output of manufactured goods.

Rapid Rise of Japanese Commerce. — The wonderfully rapid increase in the foreign trade of Japan is one of the outstanding facts of our time. At the opening of this century the annual value of this trade was about $250,000,000. In 1920 it reached $2,000,000,000, a growth of 700 per cent in twenty years. However, following 1920, the value of the foreign trade of Japan was lower than in 1920, as it was in nearly all countries. Over one third of Japan's overseas trade is with the United States.

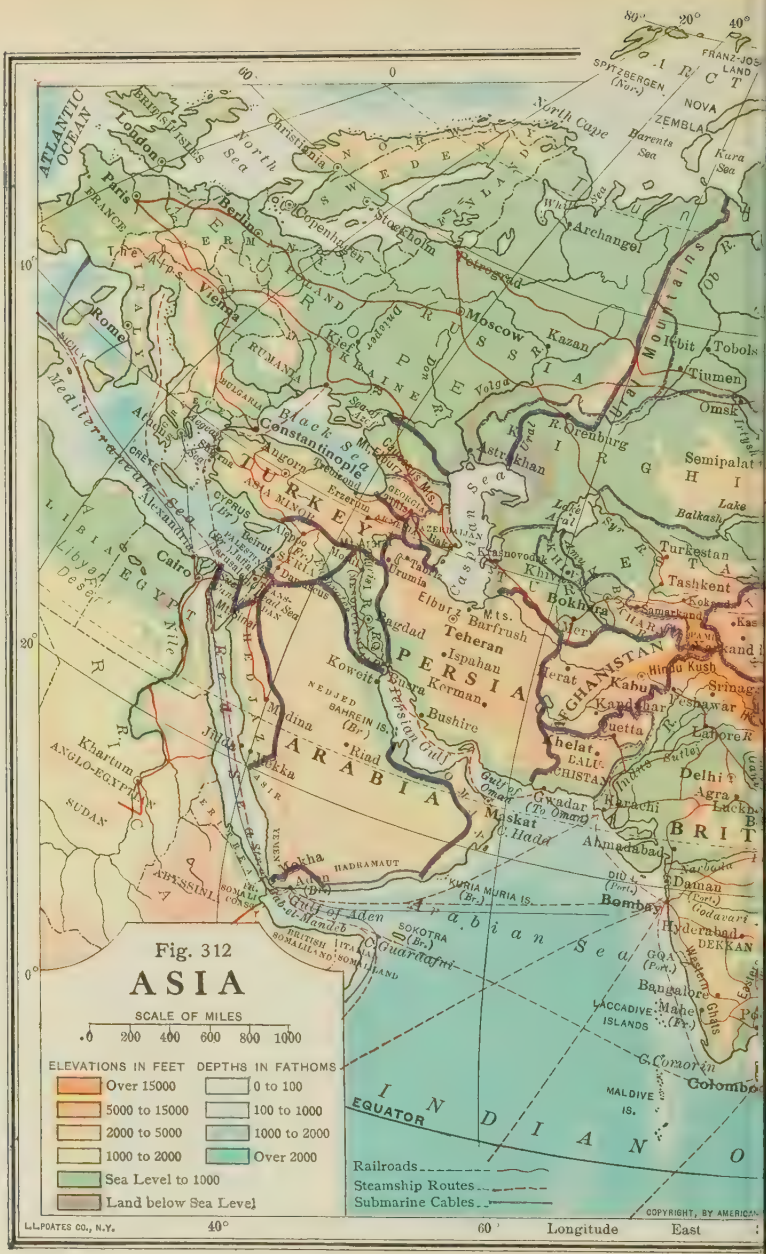


Fig. 312
ASIA
SCALE OF MILES
0 200 400 600 800 1000
ELEVATIONS IN FEET
Over 15000
5000 to 15000
2000 to 5000
1000 to 2000
Sea Level to 1000
Land below Sea Level
DEPTHS IN FATHOMS
0 to 100
100 to 1000
1000 to 2000
Over 2000
Railroads
Steamship Routes
Submarine Cables
EQUATOR
Longitude East
ATLANTIC OCEAN
Arabian Sea
INDIAN O
Mediterranean Sea
Black Sea
Caspian Sea
Red Sea
Persian Gulf
Gulf of Aden
North Sea
Baltic Sea
Aral Sea
Lake Baikal
Lake Balkash
Libyan Desert
Nubian Desert
SPITZBERGEN (Nor.)
FRANZ-JOSEF LAND
NOVA ZEMBLA
North Cape
Harents Sea
Kara Sea
White Sea
Archangel
Petrograd
Moscow
Kazan
Ural Mountains
Ob R.
Irtish R.
Tobolsk
Tiumen
Omsk
Semipalatinsk
Turkestan
Tashkent
Samarkand
Bokhara
Merv
Khiva
Astrakhan
R. Volga
R. Orenburg
Caspian Sea
Hindu Kush
Kabul
Kandahar
Herat
Peshawar
Srinagar
Quetta
Khelat
Delhi
Agra
Lucknow
Karachi
Ahmadabad
Bombay
Daman (Port.)
Hyderabad
DEKKAN
Bangalore
Mahe (Fr.)
LACCADIVE ISLANDS
MALDIVE IS.
G. Comorin
Colombo
Gwadar (To Oman)
Muscat
C. Hadd
Aden (Br.)
Hodeida
Mocha
HADHRAMAUT
KURIA MURIA IS. (Br.)
SOKOTRA (Br.)
Guardafui
Berbera
BRITISH SOMALILAND
ITALIAN SOMALILAND
ABYSSINIA
Khartum
ANGLO-EGYPTIAN SUDAN
Suez Canal
Cairo
Alexandria
Port Said
Jerusalem
Damascus
Beirut
Aleppo
Mosul
Baghdad
Teheran
Ispahan
Kerman
Bushire
Koweit
Basra
Medina
Jidda
Rabbath Ammon
Angora
Constantinople
Smyrna
Adrianople
Salonica
Athens
Rhodes
Cyprus (Br.)
Crete
Malta (Br.)
Tripoli
Tunis
Algiers
Gibraltar (Br.)
Madrid
Lisbon
Paris
London
Berlin
Vienna
Rome
Copenhagen
Stockholm
Christiania
Bergen
Hammerfest
Petrograd
Moscow
Kiev
Odessa
Warsaw
Berlin
Vienna
Rome
Paris
London
Bergen
Christiania
Copenhagen
Stockholm
Hammerfest
Archangel
Kazan
Astrakhan
Orenburg
Tiumen
Tobolsk
Omsk
Semipalatinsk
Tashkent
Bokhara
Merv
Khiva
Turkestan
Kabul
Kandahar
Herat
Peshawar
Srinagar
Quetta
Khelat
Delhi
Agra
Lucknow
Karachi
Ahmadabad
Bombay
Hyderabad
Bangalore
Colombo
Muscat
Aden
Hodeida
Mocha
Khartum
Cairo
Alexandria
Port Said
Suez Canal
Jerusalem
Damascus
Beirut
Aleppo
Mosul
Baghdad
Teheran
Ispahan
Kerman
Bushire
Koweit
Basra
Medina
Jidda

NORTH AMERICA
C. Deshnev
Bering Strait
ST. LAWRENCE I. (U.S.)
180°
120°
140°
160°
60°
WRANGELL I.
NEW SIBERIAN IS.
Bering Sea
ALEUTIAN IS. (U.S.)
Verkhoyansk
Lena R.
KAMCHATKA
Petropavlovsk
C. Lopatka
Okhotsk
Sea of Okhotsk
Yakutsk
Aldan R.
Stanovoi Mts.
SAKHALIN I.
KURIL ISLANDS
JAPAN
Angara R.
Lake Baikal
Chita
Blagoveshchensk
Khabarovsk
HOKKAIDO
Hakodate
Irkutsk
Kiakhta
Maimatchin
MANCHURIA
Harbin
Kirin
Vladivostok
HONSHU
Tokyo
Urga
MONGOLIA
Mukden
CHOSEN (KOREA)
Sea of Japan
Yokohama
Peking
Tientsin
Taiku
Seoul
Osaka
Nagasaki
Kiaochow (Br.)
Weihaiwei (Br.)
Great Wall
Yellow Sea
Sianfu
Shanghai
Nanking
East China Sea
Hankow
Hangchow
Foochow
NANSEI IS.
TROPIC OF CANCER
20°
CHINESE REPUBLIC
EMPIRE
Yangtze R.
Lassa
Yunnan
Canton
Hongkong (Br.)
Kwangchow-wan (Fr.)
TAIWAN (FORMOSA)
Macao (Port.)
PACIFIC OCEAN
Mandalay
Calcutta
Akyab
BURMA
HAINAN
LUZON
PHILIPPINE ISLANDS (U.S.)
Manila
Iloilo
Hue
FRENCH INDO-CHINA
South China Sea
Sulu Sea
MINDANAO
Rangoon
Moulmain
SIAM
Bangkok
Saigon
Cambodia
PALAWAN
SULU IS.
EQUATOR
0°
NICOBAR IS.
Strait of Malacca
MALAY PENINSULA
FEDERATED MALAY STATES
Celebes Sea
MOLUKKA OR SPICE IS. (Dutch)
CERAM
NEW GUINEA (Br.)
Achin
Singapore
BORNEO
CELEBES
Banda Sea
SUMATRA
BANKA
Banjermasin
Palembang
BILLITON
Java Sea
EAST INDIES
FLORES
TIMOR
Arafura Sea
AUSTRALIA
Greenwich
100°
Batavia
Samarang
Surakarta
Strait of Sunda
SUNDA ISLANDS
120°
140°

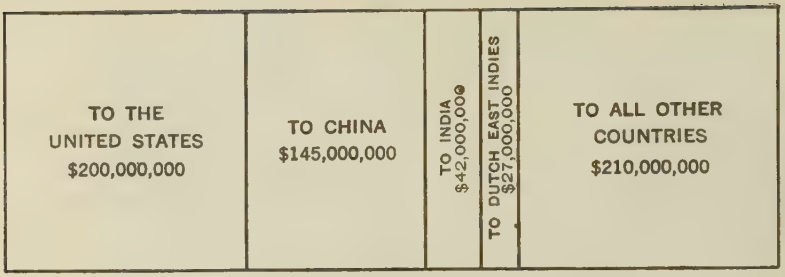

TO THE UNITED STATES $200,000,000
TO CHINA $145,000,000
TO INDIA $42,000,000
TO DUTCH EAST INDIES $27,000,000
TO ALL OTHER COUNTRIES $210,000,000

FIG. 313. Exports of Japan in one year — principal buyers.

Japan's trade with Europe is not large, partly because of the long distance between them. Next to the United States, the largest trade is with China and British India. The largest imports are raw cotton and steel products, and the largest exports are raw silk and cotton manufactures. In total foreign trade Japan ranks as one of the ten leading nations of the world.

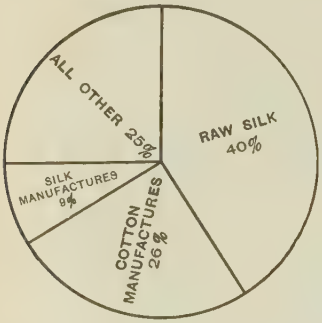


FIG. 314. Chief exports of Japan.

Japan is well provided with railroads and with steamships. The three principal ports are Yokohama, Kobe, and Osaka, which with Tokyo, the capital, are also the chief cities.

SUMMARY

Japan has advanced more rapidly than any other nation in the last seventy years. Japan proper is smaller than California, but has a very dense population. The climate is stimulating to the people, both mentally and physically. The islands are very mountainous, and only 15 or 16 per cent of the land can be cultivated; but by tireless labor the soil is forced to produce an enormous amount of food. Japan is the leading silk producer of the world, and the greater part of the raw silk is sold to the United States. Several important minerals, including coal, petroleum, and copper, are fairly abundant, but iron is scarce

FIG. 315. In the ports of Japan, steamships are commonly supplied with their coal (bunkered) by men and women working with baskets.

and must be imported. The people are keen, alert, progressive, and imitative. Manufacturing and commerce have grown with great rapidity. The land area is so small that Japan is ambitious to expand and to get at least a degree of control of the great resources of China and of undeveloped lands in Manchuria and eastern Siberia. The country's future growth will depend to a large degree upon the development of manufacturing; and one of the greatest markets in the world is that of southern and eastern Asia to which Japan is a near neighbor. The trade between Japan and the United States is large, and is essential to several of Japan's greatest industries.

EXERCISE

1. Why does the summer monsoon bring heavy rainfall, and the winter monsoon very little rainfall?
2. What countries have the monsoon type of climate?

3. How was Japan opened to foreign influences? When?

4. Give an account of the rapid rise of Japan.

5. Why is Japan faced with serious problems? What are they?

6. Point out resemblances between Japan and Great Britain.

7. By what methods has Great Britain built up her industries and commerce? To what extent can Japan utilize these methods?

8. What are Japan's points of advantage in her effort to hold a place as a world power? Points of disadvantage?

9. What minerals does Japan produce in considerable quantities? In what one is she seriously deficient?

10. Why is so small a proportion of Japan cultivable? What proportion of the land is cultivated?

11. What are the principal crops? What is the chief money crop?

12. Give an account of the silk industry of Japan. What are the two other important silk-growing countries? Why these countries?

13. To what country is the greater part of the Japanese raw silk sold?

14. Give an account of manufacturing in Japan.

15. Name several points of advantage for manufacturing possessed by Japan. Name points of disadvantage.

16. What are the two principal lines of manufacturing in Japan? Are these the same as in England? Does Japan produce the raw materials for these two lines of industry?

17. With what countries does Japan trade most largely? Why?

18. Why are textiles and steel products the chief lines of manufacturing in all the leading industrial countries?

19. Why have friendly relations between Japan and the United States been somewhat strained at times?

20. Give as many reasons as you can why the United States and Japan should remain friendly.

CHAPTER XXVIII

THE REPUBLIC OF CHINA

China's Past. — About 2400 years ago the Chinese had attained a relatively high stage of civilization — remarkably high for that early period. Some of their scholars, statesmen, and builders were men who would rank as great men to-day. One of the greatest minds that China ever produced — Confucius — lived nearly 2500 years ago. The mariner's compass and block printing were invented in China hundreds of years B.C., and gunpowder was used there in the third century A.D., long before it was known in Europe. Successful generals pushed their conquests northward and westward until a vast area, covering 4,000,000 square miles and including the outlying dependencies of Tibet, Sinkiang, or Chinese Turkestan, and Mongolia came under Chinese rule. Then China ceased to progress for nearly two thousand years, and shut out foreign influence until about 1850. In 1912 the Chinese overthrew their ruling family and declared the nation a republic, but it is a republic in name only. Almost constant internal strife goes on, between rival generals and between north China and south China, and the future of the country is very uncertain.

Parts of the Chinese Republic. — China proper consists of eighteen provinces grouped in the southeastern part of the much larger area known as the Republic of China. The outlying parts of the republic are treated as dependencies or tributary provinces. There are four of these:

(1) *Manchuria*, in the extreme northeast, is by far the most valuable. It has millions of acres of excellent farm land, valuable forests, iron and coal deposits, and a population of about 15,000,000, most of whom are Chinese. Important railroad lines traverse the territory. Japan controls the South Manchuria Railroad, and through it controls valuable coal and iron deposits.

(2) *Tibet*, sometimes called the "Roof of the World" because of its great altitude, is a vast mountainous plateau with a small,

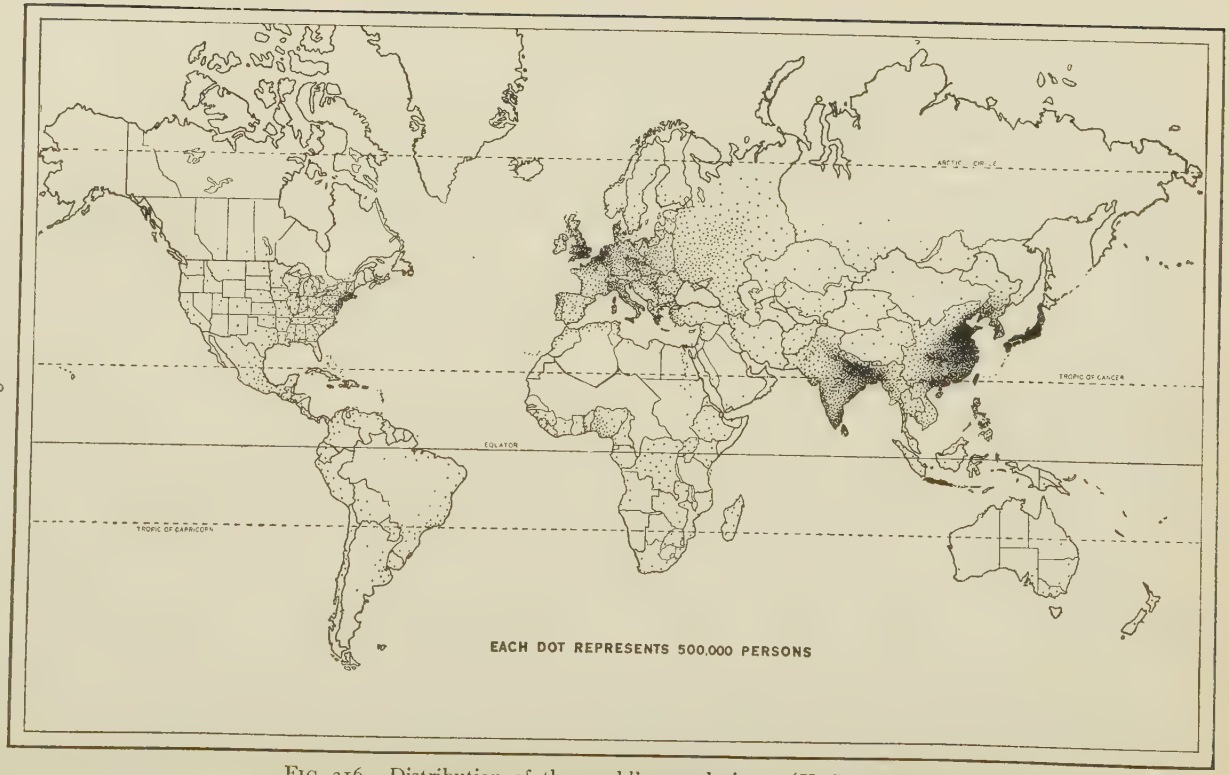


FIG. 316. Distribution of the world's population. (*U. S. Dept. Agr.*)

scattered population of backward people. China long exercised a loose control over the country; but some years ago British influence was extended into Tibet from India, and this influence is increasing at the expense of China. Tibet has very little intercourse of any kind with the outside world.

(3) *Sinkiang*, often called Chinese Turkestan, is mainly a desert, occupied here and there by wandering tribes.

(4) *Mongolia* is a vast arid or semi-arid plateau lying between China and Russia. It has only about 2,000,000 people and is almost but not quite independent; China's hold is very weak on Outer Mongolia, if, indeed, she has any hold at all.

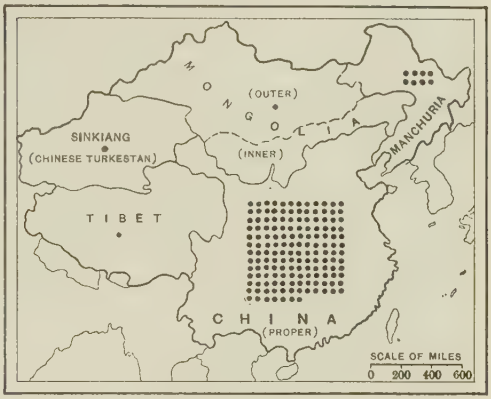


FIG. 317. Comparative population of the provinces of China. Each dot represents 2,000,000.

With the exception of Manchuria, these dependencies of China have little commerce with other countries.

Agriculture, the All-Important Industry. — From time immemorial the most honorable occupation in China has been the cultivation of the soil. The flood plains of China's great rivers, especially the Hwang and the Yangtze, are extensive and very fertile. The Hwang Ho, or Yellow River, carries down from the plateaus on the borders of Mongolia a vast quantity of rich yellow soil and spreads it upon flood plain and delta, thus year after year adding new fertility. The monsoon rains of the summer season in south China are most favorable to crops; and this, combined with the almost tropical climate of that region, gives it a very large food-producing power and helps to explain how so many people can live in this country. China proper (not including Tibet, Sinkiang, Mongolia, or Manchuria)

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FIG. 318. Rice terraces in the hilly land of China. Only thus can the necessary water be kept standing on the rice fields.

is only one third as large as the United States and half of its area is mountainous, yet it contains nearly 95 per cent of China's population, estimated at 320,000,000.

One who reads Professor King's *Farmers of Forty Centuries* learns how, by infinite care in cultivation, by putting upon the soil every bit of obtainable fertilizer, by carrying soil to rocky places and mountain sides, by irrigation, and by untiring labor of every kind, the Chinese farmer makes his little piece of land feed his family and provide a little tea, or silk, or cotton for

sale. Almost everything is done by hand, and in the south two or three crops a year are obtained from the same field. In few other parts of the world is such a large proportion of the people dependent upon agriculture.

Rice. — As in all the monsoon countries, rice is the great food crop of China, and is eaten by tens of millions of people at practically every meal. It is estimated that China devotes as many acres to rice as the United States does to wheat, and produces twice as many bushels. As a rule every individual rice stalk is transplanted to the fields from nursery beds where the seed is planted. During much of its life lowland rice grows in the water, and the little fields, often no larger than a room, are graded to water level, and surrounded by low rims of earth and sod (Fig. 318). Slopes must be leveled into horizontal terraces, and the water must be held by low dams of earth. Rice growing in the Orient is very laborious, but the yield per acre is high. China is said to have over 200,000 miles of canals, the greater number of which are used in irrigating the millions of acres of rice fields. At harvest the water is drawn off and the ripened crop is cut by hand.

Tea, Silk, and Cotton. — A quarter of the raw silk and a third of the tea produced in the world are grown in China. Both are products that require a great amount of labor, and hence they find the Orient their most suitable home. As a cotton producer, China ranks second or third among the nations, the United States being first and India the other member of the group.

The Soy Bean. — An Asiatic product that has risen to large importance in commerce in recent years is the soy bean, grown in China, Chosen, and Japan, but especially in the Chinese province of Manchuria. This bean has remarkable qualities; about 18 per cent of its weight is oil; a bushel of the beans yields from nine to twelve pounds of edible oil. The bean is also very rich in protein, and is thus a substitute for lean meat; and the meal or cake left after pressing out the oil is a valuable fertilizer. Hundreds of thousands of tons of these beans and their oil are now shipped to Europe and America to be used in

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FIG. 319. Great heaps of soy bean cakes at Mukden, Manchuria. This Chinese province is the leading producer of soy beans in the world.

making cooking-oils and soap. The soy bean has been introduced into America and is becoming an important crop here (page 79).

Mineral Wealth. — The mineral resources of China are imperfectly known, but they surely are very large. Many beds of coal and iron ore have been found; coal exists in almost every one of the eighteen provinces of China proper, and the deposits include both anthracite and bituminous. It is probable that China's coal resources are second only to those of the United States. Owing to lack of means of transportation, to Chinese ignorance of mining methods, and to the small use of steam-driven machinery, relatively little coal is mined, not over one thirtieth as much as is mined in the United States, and even less than in little Japan. The iron resources of China are also large, but not much of the ore is being mined. To these mineral resources Japan is looking to help out her own insufficient supplies. China normally produces about half of the world's supply of antimony, a metal used in many alloys such as type metal and britannia metal. Some tin also is produced.

Transportation by Water and by Land. — *The Yangtze River.* China is a land of waterways. The chief of these is the Yangtze, the great river that connects interior China with the sea. It is literally alive with boats of many kinds and sizes, for it is the chief route to one of the most populous and productive parts of the entire country. Ocean steamships go up the river 650 miles to the great city of Hankow, and river boats ascend much farther.

Canals. The Grand Canal, built many hundreds of years ago, is nearly a thousand miles in length, but a large part of it is out of repair and not used. There are thousands of miles of smaller canals; in fact, the flood plains of eastern China have a network of them. Because of the wretched condition of the roads and the small mileage of railroads, much internal commerce is carried by water. Thousands of families have no other homes than the houseboats on the rivers; the city of Canton, for example, is said to have 30,000 such families.

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FIG. 320. A few of the river craft which are common on the navigable rivers of China.

Lack of roads. China has few improved roads; most of the roads are mere paths, trails, or depressions, worn by centuries of travel. A wheelbarrow with a large wheel in the middle is the only vehicle used in large parts of China. Porters carry heavy loads on their backs for long distances, receiving for the arduous labor about twenty-five to thirty-five cents a day. The quantity of goods thus carried on the backs of men amounts to millions of tons annually. Human labor is so abundant and so cheap that it is more generally employed for transportation in China than almost anywhere else in the world. Travelers are carried in sedan chairs; boats are drawn up the rapids of the Yangtze by large gangs of coolies pulling on a tow line a thousand feet long; tea porters carry tea hundreds of miles into Tibet; and even timber and lumber are transported on the backs of men. In the north of China, camels in large numbers come in from the Mongolian desert; while in Manchuria, the stolid little Manchurian ponies are used. In methods of transportation, as in many other ways, China is very backward — although slowly improving — and the lack of good roads is one of the chief obstacles to her commercial growth.

Railroads. Railroad building in China began in 1876 and has progressed slowly, partly because of opposition from the superstitious people, and partly from lack of capital. The 7000 miles of railway now in operation were built mostly by foreign companies (Fig. 321).

Manufactures. — Manufacturing has been carried on in China for centuries, but substantially all of it was done by hand, and in most parts of the country power-driven machinery is still unknown. In certain lines of hand work the Chinese are marvelous craftsmen; their silks, embroidered robes, tapestries, carved ivory, porcelains, articles of gold and silver, and many other articles are wonders of workmanship. The Chinese workers are among the most industrious and patient in the world. The country has made some progress in modern manufacturing; there are, for example, modern cotton, woolen, and silk mills, flour and rice mills; and near Hankow is an entirely modern iron and steel

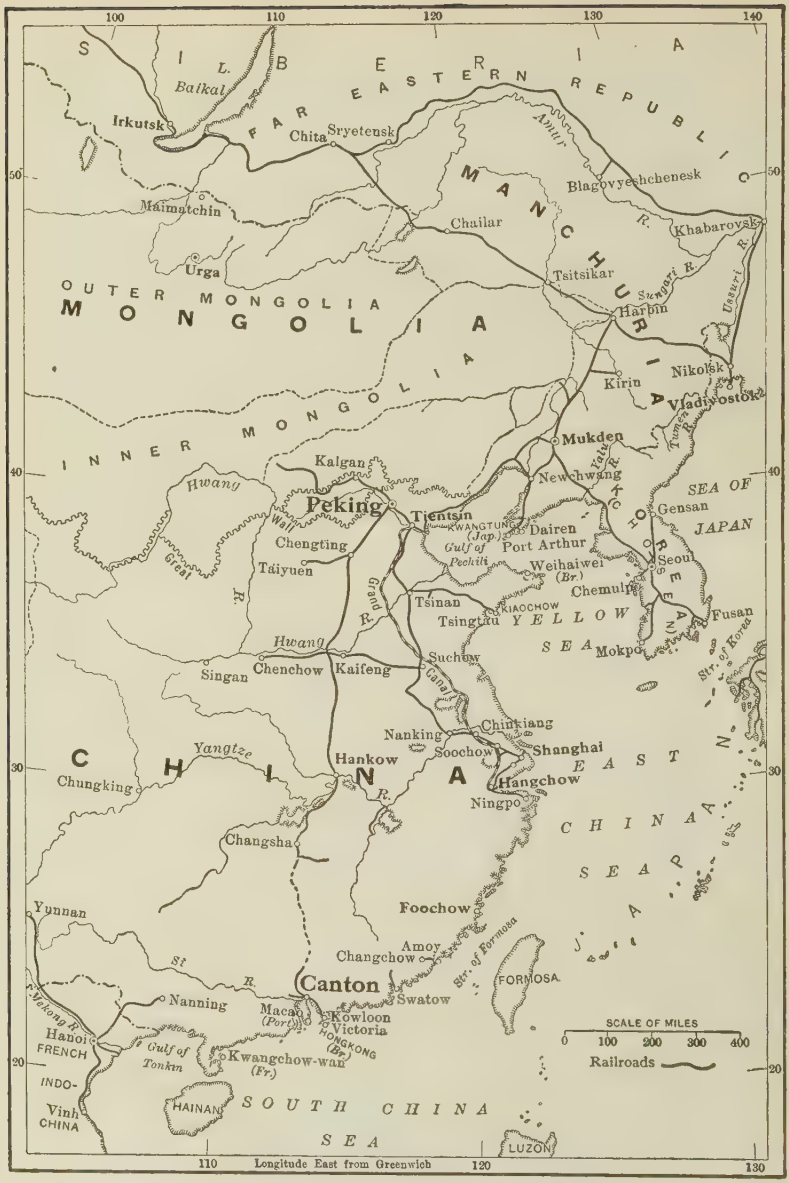

FIG. 321. Railroads of China and adjacent lands.

FIG. 322. Grinding grain by an old Chinese method. *Keystone*

plant (Fig. 323). The Chinese are very slow in taking up new ideas, and a majority of them dislike foreigners and foreign ways, and would prefer to be let alone to live as their ancestors lived. But the abundant supply of labor, the coal and iron

FIG. 323. Modern iron and steel works near Hankow, China. *Keystone*

resources, and the enormous market for goods which so large a population can provide, will bring about surely if slowly an industrial revolution, and China will increasingly adopt modern industrial methods.

Foreign Trade. — The internal trade carried on in China is large, despite the absence of good roads and the small railway mileage. The foreign trade is growing, but still is smaller than that of the Netherlands or Belgium. At present the vast majority of the Chinese are too poor to purchase foreign-made goods in any quantity. For centuries the country had to be practically self-sufficient, for it carried on only a little trade with foreign countries. So large and varied is China that nearly all the wants of the people could be and still can be supplied by home products. Only as the people learn new wants, and are able to earn the money with which to supply them, will China build up a per capita trade comparable to that of western nations. Three items of export reach large figures: silk (raw and manufactured), tea, and the soy bean and its products. On the import side, cotton goods make up nearly half the total value. Japan, because of nearness, has the largest share of Chinese foreign trade, but trade with the United States is growing steadily, and exceeds $250,000,000 a year. But when the modern development of China begins in earnest, there will arise a great demand for railway materials, mining machinery, textile machinery, and all other kinds of machinery, and the thousands of articles which the manufacturing nations make. But China must also produce in ever greater quantities the articles to which her people and land are peculiarly suited, and must sell them abroad in order that she may pay for the goods which are imported.

The Future. — The future of China is difficult to forecast. The country is not united, civil strife is more or less constant, officials are corrupt, public money is directed into private pockets, the central government can not enforce its laws, and brigandage is common. The vast majority of the people know little about public affairs and care little so long as they are left alone. Yet the Chinese are a people of truly great possibilities; the

educated class are keen and alert, by no means inferior to the white race. The common people are industrious, thrifty, and possessed of great physical endurance. If such a people shall become united under competent leadership, great things may be achieved.

Summary

The following ten facts about China should stand out prominently:

1. Its large area and enormous population.
2. The present condition of the majority of the people, poor, illiterate, conservative, suspicious of foreigners, and fearful of foreign aggression.
3. The nation-wide devotion to agriculture, carried on without machinery on little pieces of land and with a vast expenditure of labor.
4. The absence of good roads, the small use of wheeled vehicles, the small railway mileage, the extensive use of rivers and canals, and the great traffic moved on wheelbarrows or carried on the backs of porters.
5. The general practice of hand manufacture, and the small development of modern factories.
6. The wealth of coal, iron and other minerals, as yet being mined only to a slight extent.
7. The loosening of China's hold upon Tibet, Mongolia, and Manchuria, and the growth of Japanese control in Manchuria.
8. The small buying power, at present, of the individual Chinaman, but the great future possibilities of the Chinese commerce when the large population begins actively to buy foreign goods.
9. The enormous number of industrious, thrifty, hardy, dependable laborers in China — the greatest labor supply in the world, capable of achieving great things under competent leadership.
10. The sincere friendship between the United States and China, and the latter's need of genuine friendship.

Exercise

1. Be able to state the location of the following, or to point them out on a wall map:

Manchuria	Hankow	Tibet
Peking	Canton	Mongolia
Chosen	Shanghai	Hwang River
Yangtze River	Hongkong (British)	Port Arthur

2. Why is Manchuria more valuable than Tibet or Mongolia?
3. Why is a monsoon climate favorable to agriculture?
4. Why is land more carefully cultivated in China than in the United States?
5. Why are flood plains usually fertile? Why called *flood* plains?
6. Why is labor cheap in China?
7. Why is the production of tea and silk well suited to China?
8. Why is the soy bean a product of special value?
9. Why is so little coal mined in China?
10. Why is Japan anxious to get control of iron mines in China?
11. Why are waterways used much more in China than in the United States?
12. Why are roads and other public works poorly maintained in China?
13. Why is transportation by porters more common in China than in most other parts of the world?
14. Why have few railroads been built in China? How many miles?
15. Why is machinery little used in China?
16. Why is the per capita foreign trade of China small?
17. Why is it that a country of such large size and with such a great population is not able to defend itself?
18. Why is the buying power of China small?
19. Why is the Chinese Republic having a hard struggle to exist?

CHAPTER XXIX

INDO-CHINA AND THE DUTCH EAST INDIES

Indo-China

The region which includes the entire peninsula lying at the southeastern corner of Asia, is referred to as Farther India and also as Indo-China. It includes (1) Burma, which is administered as a part of British India; (2) Siam, an independent kingdom; (3) French Indo-China, a colony of France; and (4) the Malay Peninsula, the greater part of which is directly or indirectly under the rule of Great Britain.

Burma. — Like all of Indo-China, Burma has heavy rainfall, high temperature, and dense vegetation. Only about 15 per cent of the land is devoted to cultivated crops. Extensive tropical forests exist, and from them is obtained the greater part of the teakwood cut in British India. This is a hard, strong wood, resistant to decay, and excellent for shipbuilding and other uses where great strength is demanded. It is the most valuable wood found in this part of the world. Rice is the principal food crop (Fig. 332), as it is throughout the monsoon region, and Burma is one of the leading exporters because the relatively small population of that country does not require a great amount for its own needs.

Burma is the principal source of fine rubies — in fact, the only important source. These beautiful gems of deep red color are as highly prized as diamonds, and particularly fine stones are more costly than diamonds of equal size.

The oil fields of Burma are the largest producers on the mainland of eastern Asia, yielding about 1 per cent of the world's supply of petroleum. This seems like a small amount, but it must be remembered that only a small number of countries in the world yield as much as this.

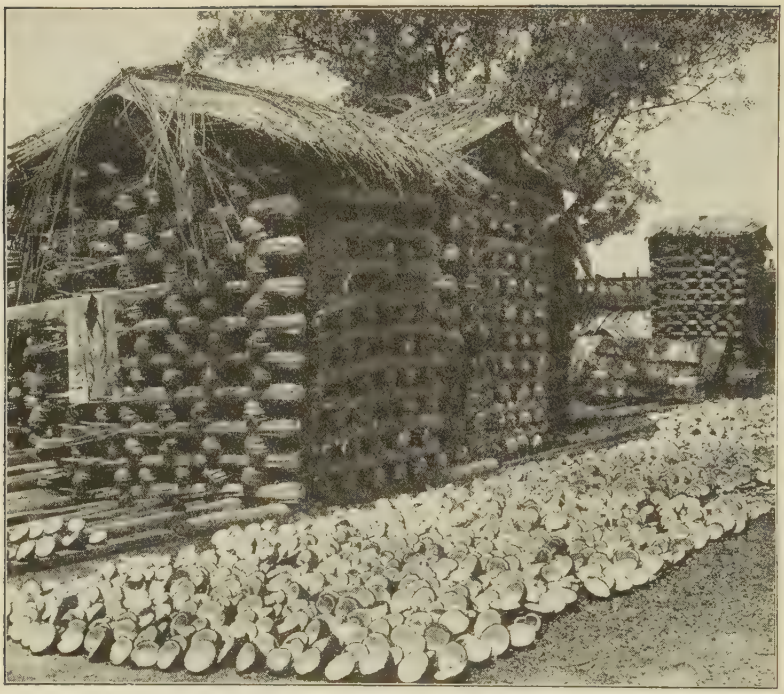

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FIG. 324. Coconuts drying to make copra (page 260); also stacks of dried rattan, at Singapore, the great seaport of the Straits Settlements.

Siam. — The kingdom of Siam is three fourths as large as Texas, and has about as many people as Pennsylvania. Rice is the all-important food crop. The productions and the trade of Siam are small because the people lack enterprise and energy.

The Chinese Outside of China. — In Siam as in all parts of the Far East, the Chinese are prominent in mercantile and industrial matters. For example, about 90 per cent of the large rice mills of Siam are in Chinese hands, and less than 10 per cent are owned by the Siamese themselves. The Chinese, bred in a more northerly climate, are hardier, more energetic, and more enterprising than the tropical peoples. Millions of Chinese have gone

into other parts of Asia and the East Indies, some as common laborers, some as merchants, others in various other kinds of business.

The Malay Peninsula. — At the very end of the Malay Peninsula is the important commercial city of Singapore, one of the chief collecting and distributing centers of the Orient. It commands the narrow Strait of Malakka, a link in the ocean highway between Europe and the Far East.

Tin. — From south China, through Siam, the Malay Peninsula, and the islands of Banka and Billiton, extends the most valuable reef of tin-bearing rocks yet discovered. The most productive mines are the placer mines near the southern end of the Malay Peninsula. These are controlled by British interests, and most of the ore is smelted at Singapore. Between 60 and 65 per cent of the world's tin comes from southeastern Asia (Fig. 325). The United States is the largest buyer of this tin, but a great deal of it comes by way of England and the Netherlands, and is sold through dealers or brokers in those countries.

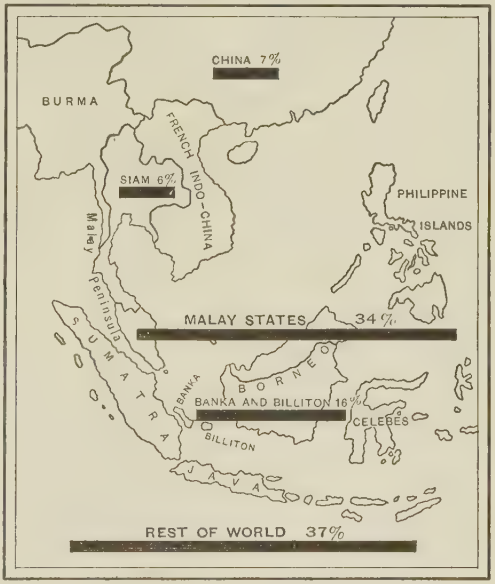

FIG. 325. Percentage of the world's tin supply produced in various parts of the world.

Rubber Plantations. — The Malay Peninsula, Burma, Ceylon, and certain East Indian islands contain most of the successful rubber plantations in existence. Here in southeastern Asia all the conditions are highly favorable to the production of planta-

tion rubber. (1) The hot, wet climate, (2) the rich forest soil, (3) nearness to ports, and (4) abundance of cheap labor, combine to make rubber production successful; in fact, so successful that the wild-rubber industry has been nearly ruined in other parts of the world. The demand for rubber has grown enormously, as shown by the fact that in 1920 the quantity consumed was nearly five times as great as it was in 1910. In 1910 forest trees supplied about 90 per cent of the world's rubber, while in 1923 plantations supplied 90 per cent.

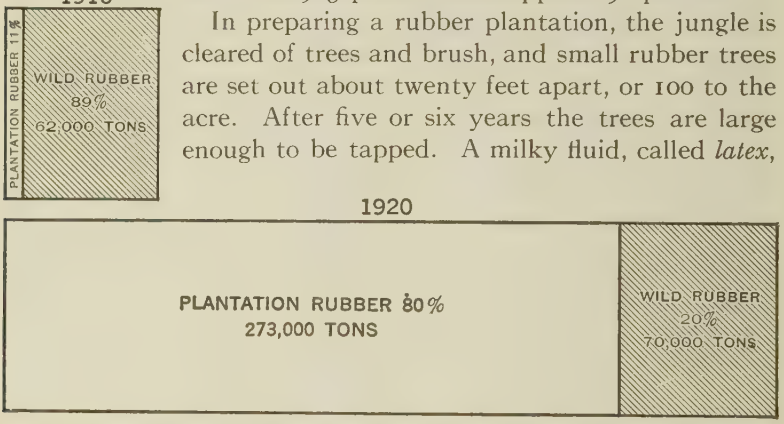

FIG. 326. The supplanting of wild rubber by plantation rubber continued, and in 1923 about 90% came from plantations.

In preparing a rubber plantation, the jungle is cleared of trees and brush, and small rubber trees are set out about twenty feet apart, or 100 to the acre. After five or six years the trees are large enough to be tapped. A milky fluid, called *latex*, comes from just beneath the bark, and is collected in a glass or porcelain cup (Fig. 327). The tapping has to be done every day. The latex is taken to a central station and poured into a large tank. Weak acetic acid is then added and stirred in; this causes the rubber in the latex to coagulate and separate from the water.

Nearly all the rubber plantations are owned by Europeans, especially by British companies. Pure rubber at one time sold for as much as $3.50 a pound; but in 1920 it was only about eighteen cents a pound. This low price was mainly due to an oversupply, and is below the cost of production. Seventy-five per

FIG. 327. Tapping a rubber tree in Java. Note the little cup for catching the liquid rubber at the base of the tree.

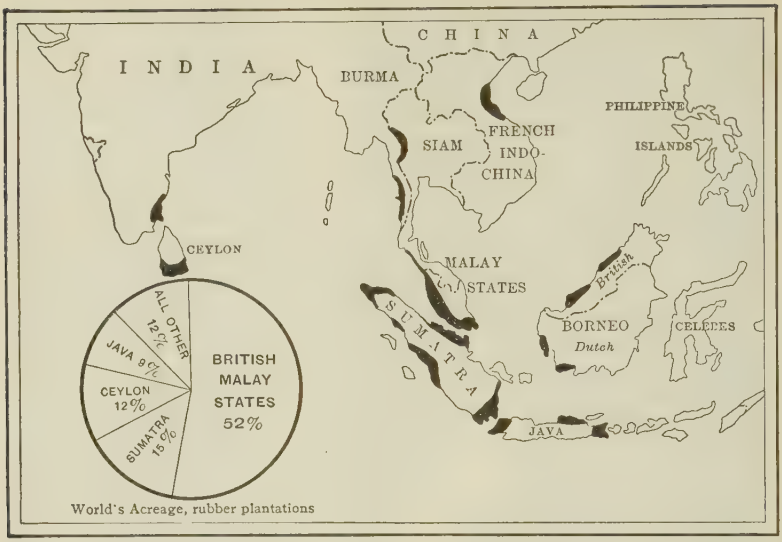

FIG. 328. Principal regions of rubber plantations in the Far East. The British Malay states have over half of the total acreage.

cent of the world's rubber is used in the United States, but in the past the greater part of it was bought through London, the chief rubber market of the world.

THE DUTCH EAST INDIES

General Description. — The little European kingdom of the Netherlands is the owner of very valuable possessions in the East Indies; these include Java, Sumatra, Celebes, the larger parts of Borneo and New Guinea, the Molukkas, and many smaller islands. Java, as large as New York state, is the most fully developed of the islands; it has a population much larger than that of Brazil, and over four times that of the Netherlands.

The Dutch East Indies lie wholly within the tropics, receive very heavy rainfall, have the fertile soil which is often characteristic of tropical lands, are peopled for the most part by the brown race, and are making steady progress under Dutch colonial

FIG. 329. The Dutch East Indies compared with part of Europe in area.

government. All the large islands except Java are covered with tropical forests, have only a very small fraction of their land under cultivation, and are in a generally wild state.

Reasons for Commercial Importance. — There are three main reasons for the commercial importance of the Dutch East Indies: (1) their ability to grow almost unlimited quantities of the tropical products which are demanded by the people of the temperate zone — such products as cane sugar, rubber, tea, spices, copra, and cinchona; (2) the millions of available laborers in this densely populated region; (3) the leadership and stable government provided by the Dutch. Undoubtedly the greatest advantage which these tropical lands have over the tropical lands of America lies in the almost unlimited supply of labor, notably Chinese coolie labor, which is inexpensive and efficient — at least efficient in comparison with other laborers in the tropics.

Mineral Wealth. — As already stated, much tin is produced in some of the islands near the Malay Peninsula. One of the important sources of petroleum for the Far East is the Dutch East Indies; they rank fifth among the petroleum-producing regions, and yield about 2 per cent of the world's annual production. Coal is mined in Java, though not in large quantities.

Products of Trees and Shrubs. — The *coconut*, from whose meat coconut oil is obtained, is the most valuable tree of the

tropics; it grows wild on tropical islands and shores all around the world. But the rapidly increasing demand for the oil has led to the establishment of coconut plantations, and these are largest and most profitable in the tropical islands and coast lands of the Far East. The trees begin bearing at about seven years of age and bear for seventy-five years or more, yielding an average of thirty to forty nuts a year. It is estimated that the world uses upwards of 10,000,000,000 coconuts annually. There are over eighty different uses to which parts of the plant and its fruit are put, the most important product being the oil which is used in making soap and nut margarine (a substitute for butter). The United States and Europe use this oil by the millions of gallons each year. The fiber from the outer husk of the coconut is made into door mats, rope, matting, mattresses, brushes, and many other articles. As an illustration of the importance of this tree, it may be said that the products of the coconut palm have a greater money value than all the rubber produced in the world each year.

The rubber plantations of this part of the world have already been discussed (pages 495–498). They are more important in the British possessions than in the Dutch East Indies, though there is almost unlimited opportunity for the production of plantation rubber in these islands.

Spices. For centuries the East Indies have been famed for their spices, once a leading article of trade between Europe and the East. Nutmegs, cloves, and mace are the special spice products of the Molukka Islands. This industry is no longer very profitable or important.

Tea and coffee are grown in considerable quantities in Java, but they have ceased to be leading products.

Cinchona or *Peruvian bark* supplies *quinine*, one of the most important drugs of commerce. Formerly the cinchona tree was extensively grown in Peru, but the Dutch carried it to the East Indies, studied its habits, and now grow the trees in great numbers and supply practically all the quinine that is used. This is an example of the effect of superior intelligence and energy in completely changing the source of production of a commodity.

Sugar in Java. — Java is one of the world's large sources of cane sugar; only Cuba and British India produce more. Java is at a disadvantage because of its distance from Europe and America, but it has an abundance of cheap labor which Cuba does not have. Many large modern sugar mills have been erected, and the industry, on the whole, is prosperous. Sugar is the largest export of the island.

Other Products. — Rice is the most important food of the people, as it is all through the Far East, and five sevenths of the land cultivated by the natives is given to this crop; yet rice has

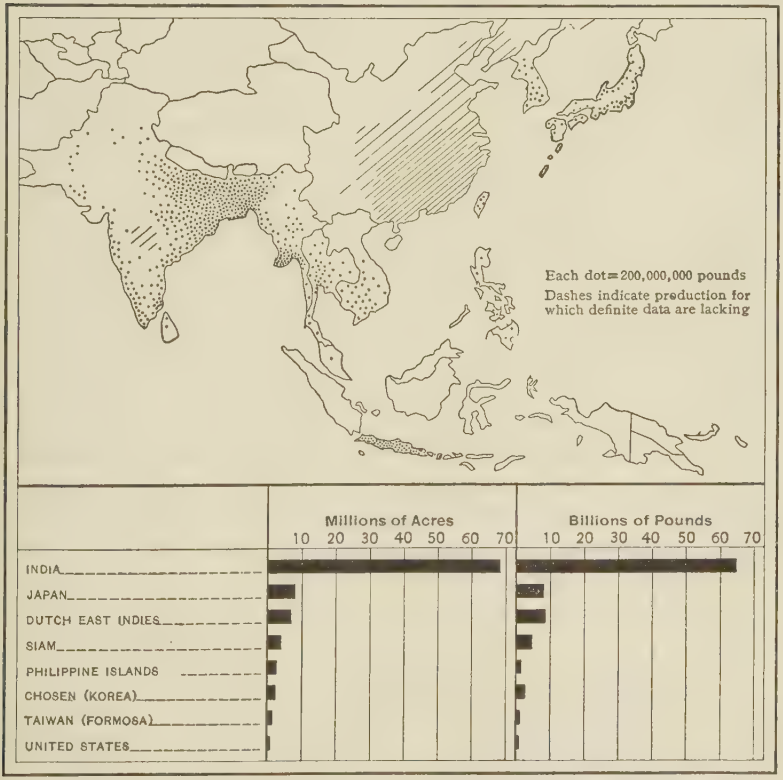

FIG. 330. Rice-producing regions of southeastern Asia, and annual production.

to be imported because of the great population that must be fed. In Sumatra, special grades of tobacco are raised in very large quantities, and some of it comes to the United States. Fiber plants such as hemp, sisal, kapok, and some cotton are grown.

Commerce. — The exports of the Dutch East Indies are of great value and are sent most largely to the home country — the Netherlands. In fact, one of the chief reasons for the surprisingly large commerce of the Netherlands is this colonial trade. The imports into the East Indies are usually less in value than the exports, and they come most largely from the mother country. In the past the United States had only a small portion of the commerce of the East Indies, but this commerce increased greatly during the World War. We are the largest users of tin, coconut oil, sugar, and several other East Indian products.

Summary of the East Indies

These islands, belonging to the Netherlands, are the most valuable island colonies possessed by any nation.

Under the rule of the Dutch, Java has become a veritable tropical garden, producing great quantities of various products, including sugar, rice, coffee, tea, rubber, and cinchona. Other islands produce large quantities of tin, petroleum, tobacco, spices, and copra. The greater part of the commerce of these islands is with the Netherlands, and the high position of the Netherlands as a commercial nation is directly connected with her possession of these rich colonies. The success of the Dutch in Java is the best example of what tropical colonies may become under efficient colonial government.

Exercise

1. Suggest the reason why the southeastern corner of Asia is called Indo-China? Why also called *Farther* India?

2. Why is rice commonly raised on deltas and flood plains? What is a delta? What is a flood plain?

3. Why is Indo-China naturally a region of dense forests?

4. Why is the site of Singapore particularly favorable for commerce? Why, do you judge, was this site selected?

5. What is meant by *placer* deposits and by *placer* mining? (Consult a large dictionary.)

6. During the twentieth century, the use of tin in the United States has increased enormously. How do you account for this?

7. Why are rubber plantations more successful in the Far East than elsewhere?

8. Why is a large part of the plantation rubber marketed through England and Holland?

9. Why is the United States the largest user of rubber among the nations?

10. Why was the price of rubber very low in the years 1915–1920? What is now the price of raw rubber? (Consult market reports in large city papers.)

11. Why are the Dutch East Indies regarded as the most valuable of island possessions?

12. Name ten important products of Indo-China and the East Indies.

13. Describe the process of collecting and preparing plantation rubber.

14. What countries or islands are the chief producers of cane sugar?

15. What products used in great quantities in the United States come from the East Indies?

CHAPTER XXX

BRITISH INDIA AND SOUTHWEST ASIA

The Empire of India

The Past. — Before Europe had risen out of barbarism, India was the seat of a high civilization. Again and again India was invaded and overrun by conquering peoples who came in through the passes of the northwestern mountains; yet the various peoples never fused into a single nation, and to this day India is a medley of colors, races, religions, and castes.

After the discovery of the sea route around the Cape of Good Hope, Portuguese and Dutch merchant ships traded with India, and both nations secured holdings on the coast. After 1600 the British East India Company gained an increasing hold upon India, and by the time of the American Revolution (1776), that company virtually controlled the country. In 1858 the control of India was taken over by the British government, and the king of England is now also emperor of India. Great Britain directly or indirectly rules most of the people of India, although a few native states retain a nominal independence. Unquestionably the people have benefited greatly by British rule, but nevertheless many Hindus resent it.

Peculiarities of Climate. — All India is either within the tropics or not far outside (Fig. 312). The densest population is in the fertile agricultural valley of the Ganges River. The climate is ill suited to Europeans, and of the 320,000,000 inhabitants only about 125,000 are British-born. English officials rarely keep their families long in India, and they themselves usually go into the mountains during the summer. The most striking feature of the climate of India is the monsoon, nowhere else so well developed or so important. If the summer monsoon is strong and brings abundance of rainfall (but not too much), crops thrive, and the people, millions of whom live in wretched poverty, are able to obtain food enough to get through the

year. But if the summer monsoon is weak and the rainfall scanty over a considerable part of the country, then crops are poor; there is a shortage of food, and millions may die of hunger or live on the verge of starvation. The famine of 1900 brought 5,000,000 deaths, and made 50,000,000 destitute. The British government has found it necessary to organize a complete system of famine relief, and this can be called into service promptly in case of need. The monsoon means life or death to millions, and is the matter of greatest concern in all parts of India, except the northwest. Nowhere else in the world does the well-being of such numbers of people hang upon a single feature of climate as is the case in India.

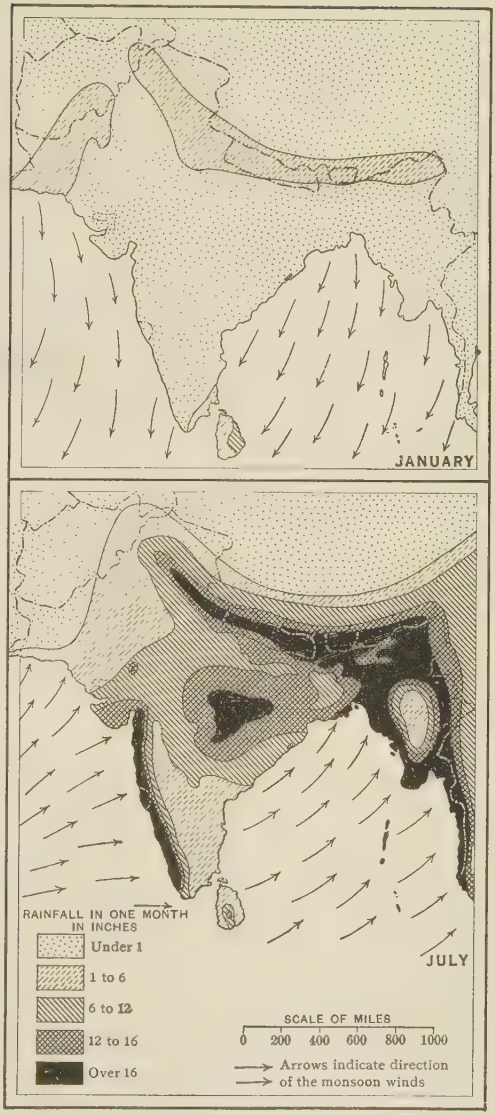

FIG. 331. Monsoons and rainfall of India.

Fig. 332. Rice-producing regions of India and Burma. (*U. S. Dept. Agr.*)

Natural Divisions of India. — India proper has two well-marked natural divisions: (1) the northern plain, made up of the valleys of the Ganges and the Indus rivers, and (2) the Dekkan or plateau which forms the peninsula (Fig. 312). West of the Indus Valley lies Baluchistan, and east of the delta of the Ganges lie Assam and Burma. All are under British rule.

Agriculture, the Predominant Industry. — India is a nation of small farmers and farm laborers living in some 600,000 villages. Only 2 per cent of the total population live in cities of over 100,000 people. Nine tenths of the rural population live

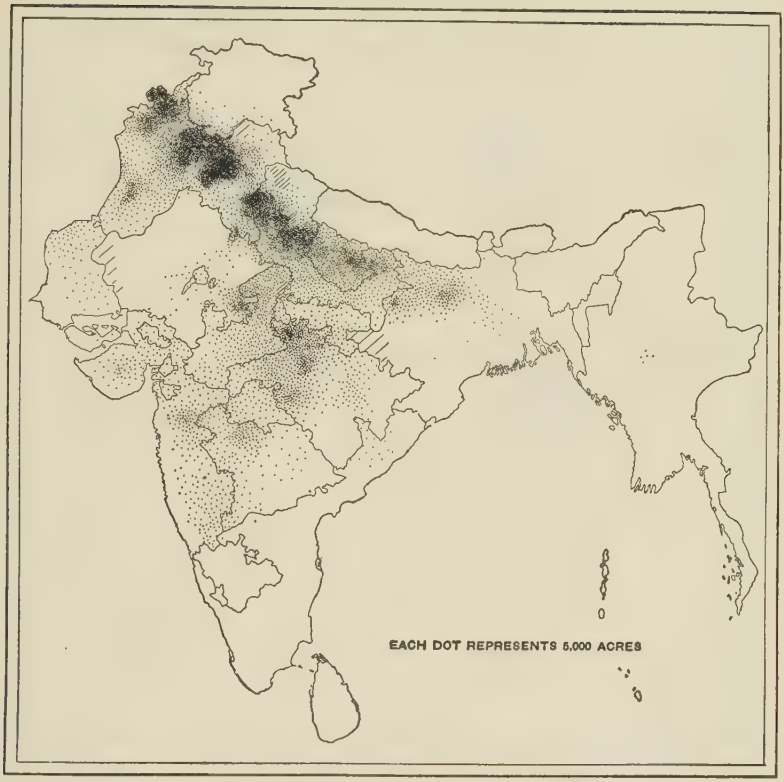

FIG. 333. Wheat-producing regions of India and Burma. (*U. S. Dept. Agr.*)

directly or indirectly by agriculture, which is carried on by exceedingly crude methods. Agricultural labor is unbelievably cheap, rarely exceeding $2 a month. Like China, India is an overpopulated country laboriously struggling to feed itself by intensive but unscientific cultivation of the land. On an average three persons live on the proceeds of two acres. Rice is the all-important crop in the lowlands (Fig. 332), and millet is a leading food crop of the higher lands. One third of the cultivated land is devoted to rice alone. Wheat, grown mainly in the drier northwestern section (Fig. 333), is important, and is raised partly

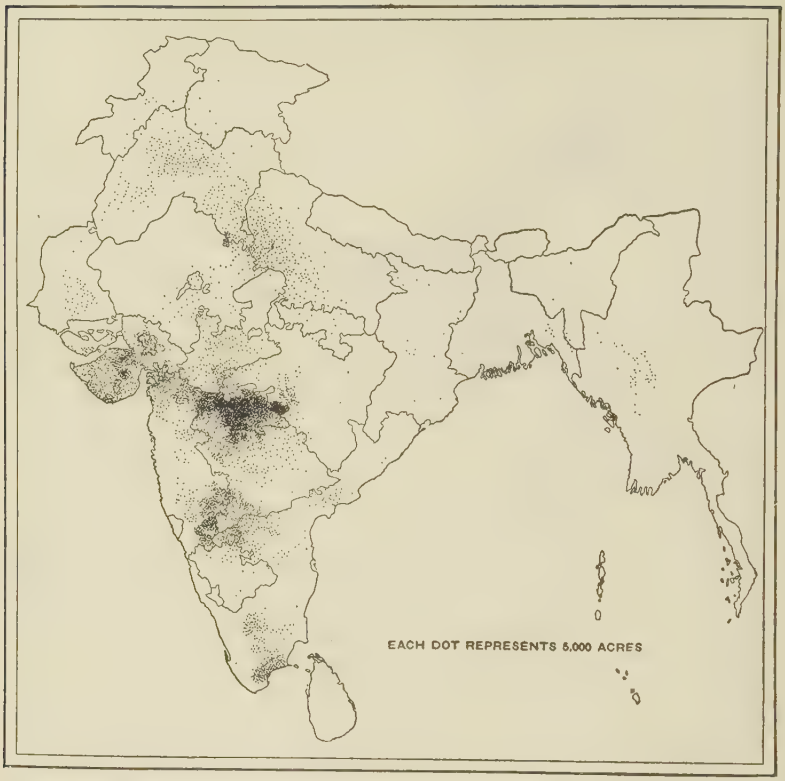

FIG. 334. Cotton-producing regions of India and Burma. (*U. S. Dept. Agr.*)

for export. India ranks second or third in the growing of cotton (Fig. 334), the United States and sometimes China being larger producers; it ranks second to Cuba in the production of cane sugar, practically all of which, in India, is for home consumption.

Jute is an extensive crop (5,000,000 tons or more) in the lower Ganges Valley. This fiber is used in making the coarse fabric called burlap, or gunny cloth. The jute fiber comes from the inner bark of a plant that finds the hot climate and wet soil of the Ganges delta perfectly suited to its growth. Bags made from jute are sent by the thousands of bales to Brazil for

shipping coffee; to Cuba for sugar, to Argentina and Australia for wheat, to Chile for nitrate, to the United States for cotton bales — in fact to every part of the commercial world. More

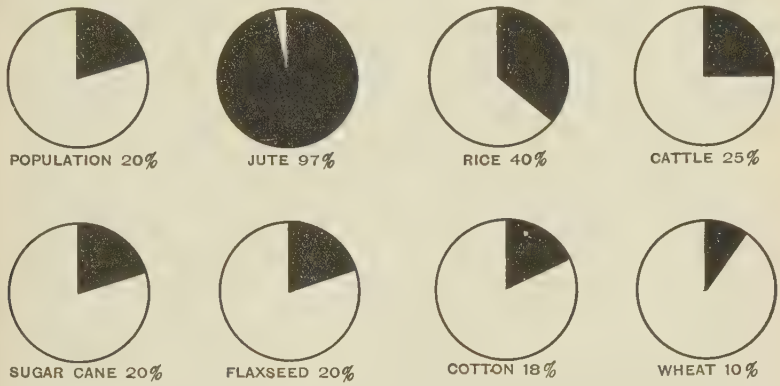

FIG. 335. Percentage of the world's population and of leading agricultural products credited to India.

than 1,000,000,000 yards of the cloth and 800,000,000 gunny bags are made and sold in an average year.

The growing of tea in Assam and in the island of Ceylon has increased rapidly during the past generation, and India is now the leading tea exporter of the world, though China probably remains the leading producer. The Hindus are large users of vegetable oils, pressed from several varieties of oil seeds which

FIG. 336. Percentage of the world's tea exports from each producing country.

are widely grown. These oils take the place of animal fats such as butter and lard which are so largely used in the United States.

Irrigation. — India leads all other countries in the extent and importance of its irrigation works. Nearly 50,000,000 acres of land are irrigated — three times as much as in the United States. The rainfall in parts of India (*e.g.* the lower Indus Valley) is inadequate for crops, and in some other parts it is uncertain. So dense is the population and so dependent are the people upon agriculture that irrigation is a necessity; under British rule great progress has been made, especially in the construction of large irrigation dams, reservoirs, and canals. Wells, ponds, and cisterns numbering millions are employed for private irrigation purposes. Nearly all the rainfall of India comes in the summer, but the winter is so warm that winter crops can be grown if water can be brought to the land; the production of these winter crops is one important purpose of irrigation. In the United States only $1\frac{1}{2}$ per cent of the cultivated land is irrigated; in India 20 per cent is under irrigation.

Live Stock. — There are more cattle in India than in any other country in the world, but most of them are of inferior quality. They are kept for milk, and still more largely for work animals, but not to any extent for beef; the chief Hindu religion teaches its followers not to kill animals, and millions of devout Hindus have starved in time of famine rather than kill a cow or a bullock for meat. The water buffalo is especially valuable for milk and for working in the mud of the rice fields.

In the dry and rugged parts of India great numbers of sheep and goats are raised; in fact India is one of the important sources from which the United States gets goatskins and kidskins for leather. Nowhere in the Far East are horses numerous; their work is done by human beings. India has only about a million in all, or one for 300 people. Hardly any swine are raised.

Mineral Products. — India probably has greater mineral wealth than is known, but the present production is small. Less coal is mined than in little Japan, yet coal is the chief mineral product, and gold is second. Burma produces considerable petroleum, but the value of all the minerals produced in India

does not equal that of the copper produced in the single state of Arizona. The Hindus have neither the capital nor the training necessary to develop extensive mineral industries.

Railroads. — India and Japan are the only Asiatic countries that are well supplied with railroads, India having half the railroad mileage of Asia. The rich, densely populated Ganges Valley has a network of railroads, and the Dekkan is traversed by many lines. Practically all are British-built and most of them are state-owned. The improved means of transportation provided by these railroads has greatly aided in reducing the suffering due to famines.

Manufactures. — A great deal of manufacturing is done by hand in India, but more recently machinery has been introduced, and mills and factories are increasing. Half a million workers are employed in the cotton mills and jute mills, which are the most important manufacturing industries. The metal industries, which are leaders in the highly industrial countries like the United States and Great Britain, are of secondary importance in India, where scientific knowledge and technical training are not possessed by many people. The British officials do not repress manufacturing, nor do they actively encourage it, for British manufacturers naturally desire to sell their own products in India; in fact, that is one of the chief reasons why Great Britain desires to retain this populous dependency.

Overseas Commerce. — There is little opportunity for trade with India except by sea, for most of its land boundary is the huge mountain wall of the Himalayas. Three fourths of the imports come from Great Britain, but only one fourth of the exports go to that country. Five products — all agricultural — make up the major part of the exports: (1) jute and its products, (2) cotton and its products, (3) tea, (4) hides and skins, (5) rice. The imports are, of course, mainly manufactured articles. The United States buys considerably more from India than it sells to that country. The total foreign trade of India is less than that of Canada, though the people of India outnumber the Canadians more than thirty to one.

Cities. — India is a country of famous cities. Calcutta, near the mouth of the Ganges, is a modern city, built since the English came into the country. It is the chief commercial city and was, until some years ago, the seat of government, but this has since been removed to the ancient city of Delhi. Bombay on the west coast is the chief port of India for the ships that use the Suez Canal. Madras is the principal port on the east coast of the peninsula. Benares, on the Ganges, is the holy city of the Hindus, and is visited yearly by thousands of pilgrims. Rangoon is the chief port of Burma.

FIG. 337. View of one of the many tea plantations on the hill slopes of Ceylon. About one fourth of the export tea of the world comes from this island.

Ceylon. — The island of Ceylon, already mentioned for its production of tea and rubber, is a British colony separate from India. Its capital, Colombo, is an important port of call for ships sailing between Europe and the Far East.

Summary. — India has more than half the area of the United States, and has about 320,000,000 people of many languages,

races, and religions. It is the most important colony of the British Empire, and the most populous. Agriculture, carried on by unscientific methods, is the chief occupation. Most of the people live in poverty, and when in the past the monsoon rains failed, terrible famines occurred and millions perished. Through irrigation, improved transportation, and famine-relief organizations, conditions have greatly improved. Rice is the chief food crop. India is second only to Cuba in the production of cane sugar, and is one of the three leading producers of cotton. More cattle are raised than in any other country, but not for meat. Jute, tea, cotton, and hides are leading exports. The population is so great that the per capita exports are small, and the per capita imports are necessarily small; yet the total trade is large enough to give India eighth place among the countries of the world.

Southwestern Asia

Character of the Region. — Southwestern Asia includes (1) the great desert plateau of Arabia, (2) Turkey, (3) lands south of Turkey, freed from Turkish rule by the World War, (4) Persia, and (5) Afghanistan. It is a region of backward development, due to three principal causes: (*a*) the rough and mountainous surface, (*b*) the scanty rainfall, and (*c*) the notoriously bad governments. The people are nearly all Mohammedans; only a small proportion are educated; many are nomads without settled abodes; and in nearly all respects the conditions of life in this region are unfavorable to the development of commerce. Persia has only a small railway mileage; Afghanistan has none; the Arabian peninsula has only a single line near the Red Sea; and Turkey and adjacent lands have only a few lines, built quite recently and mostly by Europeans. These lines include a portion of the famous Berlin to Bagdad Railroad by means of which Germany hoped to bring this region into increasingly close connection with herself.

Political Control. — Persia and Afghanistan are nominally independent countries; Turkey, reduced to Asia Minor, or

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FIG. 338. Caravan on the Jerusalem-Jericho road in Palestine. Note the semi-arid character of the country.

Anatolia, is independent; a long strip of land adjacent to the Red Sea is the nominally independent kingdom of Hedjaz; some other parts of Arabia are independent. Syria is under French control, and Palestine and parts of Arabia are controlled by the British. Mesopotamia or Iraq is an Arab kingdom over which the British have a measure of control, but here and elsewhere in Southwestern Asia the situation is unsettled and subject to change.

Resources and Products. — Relatively little is known of the mineral resources of this extensive region, but one resource

known to be extremely valuable is petroleum. There are highly promising oil fields in Persia and Mesopotamia, claimed mostly by the British, and it is believed that this general region may prove to be one of the great petroleum reserves of the world (Fig. 105); it is not very far from the rich oil field at Baku on the Caspian Sea. Considerable iron, but very little coal, has been found. However, the high taxes formerly imposed upon industries by the Turkish government, and the lack of modern means of transportation, have discouraged systematic search for possible mineral wealth. The great majority of the people of southwestern Asia live by some form of agriculture, by tending flocks of sheep and goats, or by keeping camels, cattle, and horses. Figs and olives are characteristic products of these dry, rocky lands, and dates come from the oases. From the native wools are made the most famous and expensive rugs in the world, including many varieties of Oriental rugs which reach the outside world through such ports as Constantinople and Smyrna.

The general backwardness of Persia may be judged from the fact that in its total area — three times that of France — there are only about 170 post offices, and its total foreign commerce for a year is less than that which passes through New York harbor in a single day.

Exercise

1. Why cannot the people of India be regarded as forming a single nation?
2. Why is the densest population of India found in the valley of the Ganges?
3. Why do few Europeans live permanently in India?
4. Why do the monsoon winds blow from the sea to the land in summer and from land to sea in winter (page 465)?
5. Why does the summer monsoon bring rain?
6. Why does the summer monsoon mean so much to the people of India?
7. Why, in the past, were famines more common in India than they are now?
8. Why do famines occur in India but not in the United States?

9. Why is labor extremely cheap in India?

10. Why is little farming machinery used by Hindu farmers?

11. Why are the rice fields almost wholly confined to the low lands?

12. Why is the land in India tilled more intensively than in the United States?

13 What are the principal crops of India?

14 Why is little or none of the sugar produced in India exported?

15. For what is jute used? Where in India is it grown? Why are such great numbers of jute bags used?

16. What other coarse fibers have we studied?

17. Where in India is most of the tea raised?

18. What do the Hindus use in place of butter, lard, and animal fats generally?

19. Why is irrigation far more important in India than in the United States?

20. Why do many Hindus refuse to eat meat?

21. Why are the mineral industries not well developed in India?

22. Why has most of Asia few railroads? What two countries are well supplied with railroads? Why do these two countries have more than other Asiatic countries?

23. Why do not the British actively encourage the establishment of manufacturing in India?

24. Why does most of the foreign commerce of India come and go by sea?

25. Why does Great Britain control more of the foreign trade of India than any other country?

26. Why is the *per capita* foreign trade of India small, but the *total* trade large?

27. Why does Great Britain regard India as the most valuable of the outlying parts of the British Empire?

28. Why is Japan likely to be a strong competitor of Great Britain for the trade of India?

29. Why does southwestern Asia produce comparatively little? Why is the foreign trade of this region small?

30. Why are the countries in this part of the world backward?

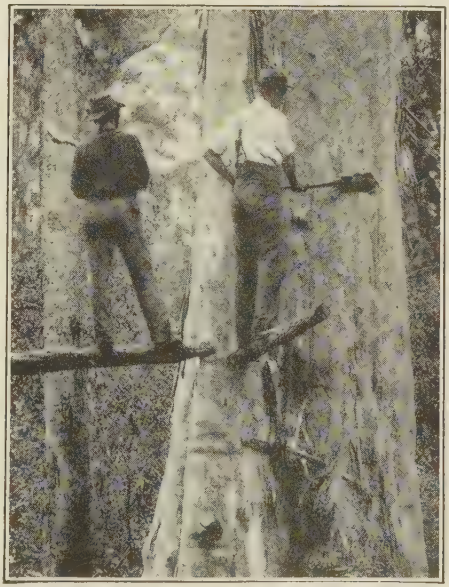
31. What important mineral substance is known to exist in large quantities in this region?

CHAPTER XXXI

AUSTRALIA AND NEW ZEALAND

The Commonwealth of Australia

General Description. — Australia, once called the largest island but now regarded as the smallest continent, is about the size of the United States. It began its history as the home of white people at about the same time that the United States became independent. Most of Australia is made up of plains and low plateaus, with only one important mountain range, the Great Dividing Range, which is very close to the eastern coast; so close, in fact, that it seriously affects the rainfall of the continent (Fig. 340). Nearly half of the country is a vast desert, much of it totally uninhabited, and some of it unexplored. The whole continent has only one river system of any importance — the Murray - Darling system, many of whose tributaries become dry a part of the year. There are luxuriant forests in the north (Fig. 339). The best



Gilliams Service

Fig. 339. Felling a gum tree (eucalyptus) in Australia. By cutting high on one side and low on the other, the lumbermen make the tree fall exactly where desired.

harbors, the best farm land, and most of the people are on the eastern and southeastern coastal strip. The only other region where any considerable number of people live is in southwestern Australia, which, at present, contains the chief gold mines of the continent.

The Commonwealth of Australia is one of the self-governing dominions of the British Empire. It is composed of six states — New South Wales, Victoria, Queensland, South Australia, Western Australia, and the island of Tasmania, and also the Northern Territory. The chief cities are Sydney, Melbourne, and Adelaide.

Unusual Social and Political Conditions. — The Australians are a people of notable vigor and independence. They have small respect for traditions or past political practices that do not fit Australian conditions. Among other things they are determined to keep Australia for the white race, and in the main for people of British stock; and almost the entire population is of this stock. At times the labor unions have been so strong that they have controlled legislation. The government is made to serve the ordinary needs of the people in more ways than in any other part of the world, unless it be in New Zealand. For example, the government owns and operates the railroads, lends money, drills wells in the desert, builds fences to keep out the rabbits, assists immigrants and settlers, buys and stores farm products, supplies money for many undertakings which Americans regard as private business, and in general acts as a great business concern.

In spite of the large areas of land suited to cultivation or pasturage, the people live in cities to an ever greater extent. Over 40 per cent live in the six state capitals. There is much agitation and unrest among the people, a huge national debt, and very little immigration, although immigrants are needed; yet most of the people are intensely patriotic and proud of their country, and the average per capita wealth of Australia is among the highest in the world.

The United States has acquired a population of over 100,000,000, while Australia has less than 6,000,000. The United States has opened its doors to all Europeans, while Australia has been much more selective. It is true that the United States has vastly more agricultural land and much greater natural resources than Australia, and it is also much nearer to Europe.

The Dominating Influence of Climate. — Climate, good or bad, is always a dominating influence in the life of a people, but this fact is rarely so impressive as it is in Australia. The northern part of the continent lies in the torrid zone, and has only a sparse population; the larger part lies in the mild part of

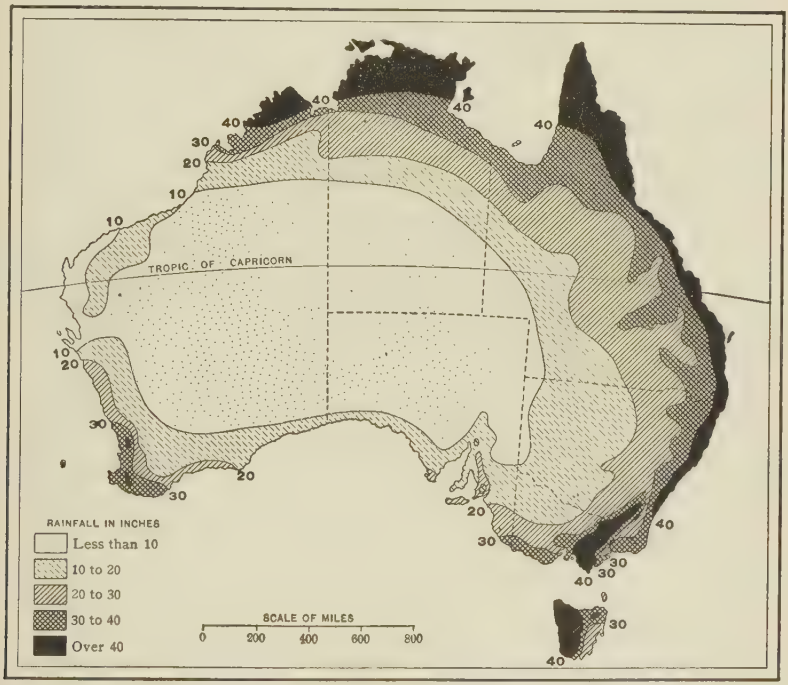


FIG. 340. Annual rainfall of Australia.

the temperate zone. Even in the southern states, which are the coolest, the temperature is never severe, and snow never falls on the lowlands; cattle and sheep graze in the pastures all the year round, and practically no shelters are required for them. This condition — similar to that in the pampa of Argentina and in Uruguay — reduces the cost of raising cattle and sheep as compared with the cost in the colder parts of the United States.

But an even more important feature, the rainfall, is most unfavorable. The larger part of Australia lies in the belt of the southeast trade winds; and the only important range of mountains in the continent extends north and south, parallel to the east coast and near it. This works out badly for Australia, for the rain-bearing winds blowing in from the sea are robbed of their moisture in passing over these mountains almost as soon as they reach the land, with the result that about the only part of temperate Australia that receives enough rainfall to maintain general agriculture is a narrow coastal strip (Fig. 340). On the leeward (western) slope of the mountains there is enough rainfall for a few crops, but the greater part of this semi-arid land that is used at all is devoted to sheep pastures.

Only a little more than 1 per cent of the land of Australia is under cultivation, and this is chiefly, though not wholly, due to the lack of rainfall. Even the grazing regions and some of the farming regions at times suffer destructive droughts; 15,000,000 sheep perished in a single season in 1902, and the wheat crop of that year dropped from the usual 35,000,000 or 40,000,000 bushels to 12,000,000 bushels. Australia can provide homes for many times its present population, yet the fact that fully three fourths of the continent is desert or near desert cannot be changed.

Australian Sheep, the Chief Producers of Wealth. — In the temperate zone, sheep raising is an industry on lands of light rainfall. This is true for two reasons: (1) sheep can live on more scanty pasturage than cattle; and (2) sheep are less subject to certain diseases in a dry climate than in a moist one. In Australia, the greatest sheep-raising country in the world, the sheep are pastured mainly in regions where the rainfall is between ten and thirty inches (Fig. 341). In 1890 there were about 100,000,000 sheep in the country, but the number has since declined.

Australia raises select breeds of Merino sheep; the finest and largest fleeces of wool are produced, and Australian wool has no superior. Formerly the sheep were raised entirely for their wool, but more recently cross-breeds have been raised

increasingly for mutton, which is sent in refrigerator ships to the English market.

Wool is the most valuable product of Australia; and the exports of sheep products — wool, sheepskins, mutton, and

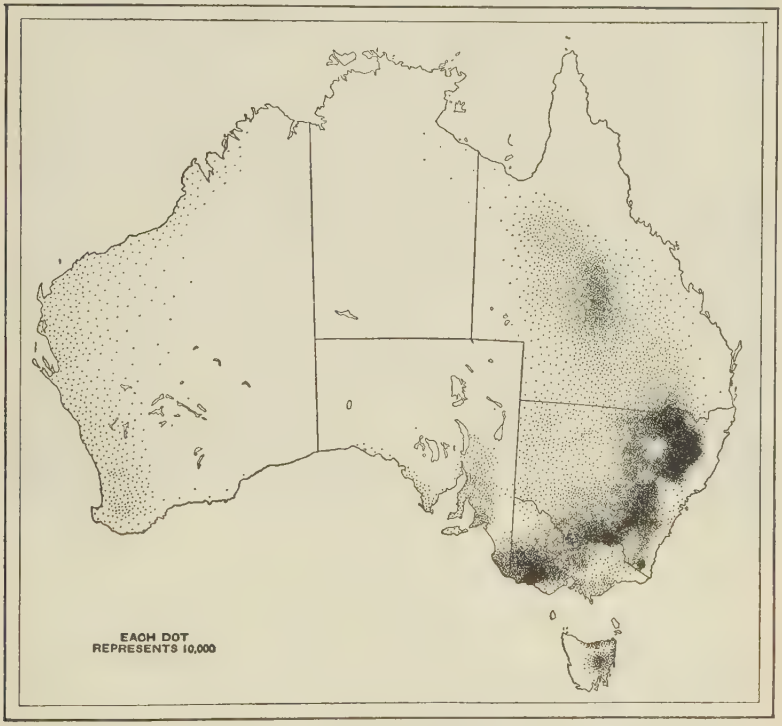


FIG. 341. Distribution of sheep in Australia. (*U. S. Dept. Agr.*)

tallow — form fully one third of the exports of the country. The high per capita wealth of the people of Australia is in large measure due to the vast sums received annually for the wool clip, for nearly a fourth of the wool used in the world comes from Australia.

In the past, sheep ranches (called "stations") were sometimes of enormous size — hundreds of thousands of acres. It is said

Brown Bros.

FIG. 342. In countries where sheep are sheared by the millions, sheep shearing is a skilled trade and is done very rapidly with machine clippers.

that at one time 100 men in Western Australia controlled over 40,000,000 acres of land. But the tendency is steadily toward the subdividing of these into smaller holdings.

The World's Trade in Wool. — Next to cotton, wool is the world's most important textile fiber, and the greater part of it comes from lands that are either (1) semi-arid, or (2) hilly or mountainous. To this general truth there are two important exceptions: Great Britain and European Russia have long been prominent in the raising of sheep. The great wool-growing countries of the world are Australia and New Zealand, the United States, Argentina, South Africa, Spain, Great Britain, and Russia. The annual consumption of wool is about $1\frac{1}{2}$ pounds

Wide World Photos

FIG. 343. Shipping wool at the port of Sydney. From the show rooms to the pier, the wool is conveyed through the tubes seen at the left.

for every man, woman, and child in the world, but probably half of the people of the earth use no wool at all. For a long period, London was the greatest assembling point for wool in the world, and woolen manufacturers from all leading countries sent buyers to the annual wool auctions in London. More recently, the coast cities of Australia, and Boston in the United States, have held similar auctions and have weakened London's hold on the wool trade of the world.

Australia as a Source of Food for Great Britain. — It is a well-known fact that Great Britain, and especially England, produces only a small fraction of the foodstuffs that its people require; and that one of the reasons why Great Britain and other countries desire colonies is that the colonies may supply the

home country with foodstuffs and raw materials. Australia is a long distance from England, but ocean transportation is sufficiently cheap to permit products of Australia and New Zealand to be taken to the British Isles. More than half the total overseas trade of Australia is with the mother country, which buys a greater part of the beef, mutton, butter, flour, wheat, and dried fruits exported from Australia. Wheat is the most important food crop and largest food export of the Commonwealth.

The Rabbit Pest. — White settlers introduced rabbits into Australia, but did not introduce their enemies. As a result, large parts of the continent have been literally overrun with millions of rabbits, which multiply with unbelievable rapidity, and which eat every green thing within reach. In some sections they ruined the country, and the settlers moved away. Millions of dollars are expended annually in killing the "vermin," as rabbits are called. Thousands of rabbiters devote themselves to hunting; one rabbiter often kills from 300 to 400 rabbits a day, and earns from seventy-five to one hundred dollars a week, partly from bounties paid for killing the rabbits, and partly from the sale of the skins. The most effective method of combating the pest is by building rabbit-proof fences of woven wire. Thousands of miles of this fence have been built at the cost of many millions of dollars. Great numbers of the dressed rabbits are exported to be used for food, and millions of the skins come to the United States, where the fur is used mainly in the manufacture of felt hats. A prize of 25,000 pounds sterling (nearly $125,000) has been offered by the state of New South Wales for the invention of an effective means of general destruction of this animal pest. Rabbits are also very troublesome in New Zealand.

The Mineral Wealth of Australia. — *Gold.* Shortly after the gold rush to California, gold was discovered in eastern Australia (1851), and a gold rush to that continent began. Wonderfully rich deposits were found; hundreds of nuggets weighing five pounds and upwards were discovered, and during the first ten years, $486,000,000 in gold was taken out. Later, gold was found in southwestern Australia, and for a few years Australia led the world in gold production, but it now ranks third (Fig. 357).

Coal. Australia has more known coal than all the rest of the southern hemisphere. It is of fair quality, and the best mines are close to the eastern coast, where it is most needed, and whence it

is exported. The West Coast cities of the United States and the West Coast of South America import coal from Australia.

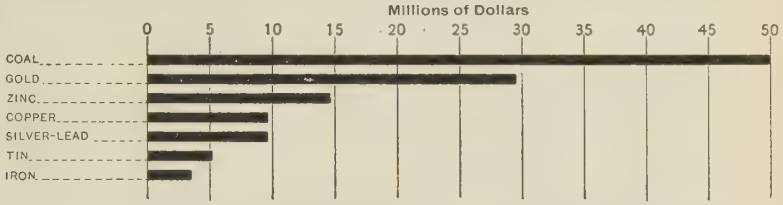


FIG. 344. Approximate annual value of mineral products, Australia.

Other minerals. A small amount of iron is mined, and is used in the industries of the country. In the state of New South Wales, the Broken Hill district is a very large producer of lead, zinc, and silver. This district has already yielded $500,000,000 worth of ores, and supports a mining center of 35,000 people in the desert. Australia and Tasmania include the southern extension of the tin-bearing rocks which occur in south China, the Malay Peninsula, and the East Indies. Though the mineral products of Australia are valuable, the total output does not equal in value the one item of wool.

Manufacturing. — A young country, especially one so largely devoted to grazing and agriculture as Australia is, would not be expected to have developed manufacturing to any large extent. However, its manufacturing industries grew notably after 1900, and most notably during and after the World War.

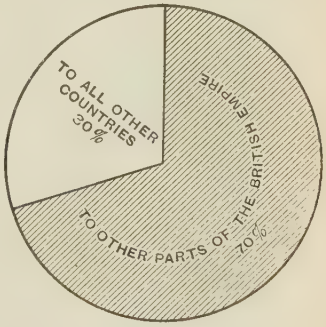


FIG. 345. Destination of exports from Australia.

Foreign Commerce. — Australia sells more than it buys. At times the total commerce has exceeded $1,000,000,000 a year, or $200 per capita, which is very high. Great Britain receives most of the exports and supplies more of the imports than any other country. The trade of the United States with Australia increased notably after 1916.

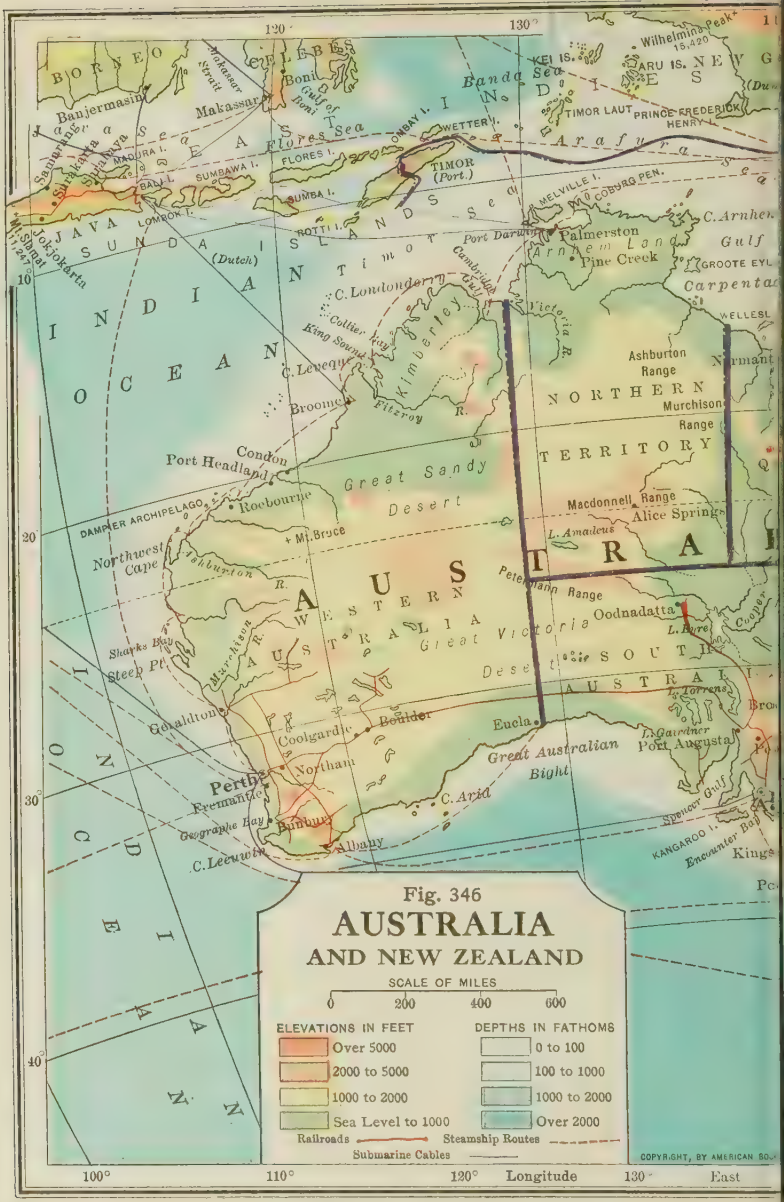


Fig. 346

AUSTRALIA AND NEW ZEALAND

SCALE OF MILES

0 200 400 600

ELEVATIONS IN FEET	DEPTHS IN FATHOMS
Over 5000	0 to 100
2000 to 5000	100 to 1000
1000 to 2000	1000 to 2000
Sea Level to 1000	Over 2000

Railroads — Steamship Routes

Submarine Cables

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NEW IRELAND
160°
170°
NEW BRITAIN
Mt. Balbe 10,168
BOUGAINVILLE I.
CHOISEUL I.
SOLOMON ISLANDS (British)
ISABEL I.
NEW GEORGIA
GUADALCANAR
MALAITA I.
D'ENTRECASTEAUX IS.
LOUISIADE ARCHIPELAGO
RENNELL I.
SAN CRISTOVAL
SANTA CRUZ IS. (Br.)
VANIKORO IS.
Coral Sea
10
Cooktown
Cairns
Great Barrier Reef
Townsville
PACIFIC OCEAN
BANKS IS.
ESPIRITU SANTO
NEW HEBRIDES (Br. & Fr.)
MALIKOLO I.
AURORA I.
PENTECOST I.
AMBRYM
SANDWICH I.
EROMANGA I.
TANNA
CHESTERFIELD IS. (Fr.)
Mackay
Clermont
Rockhampton
NEW CALEDONIA (French)
LIFU
LOYALTY IS. (Fr.)
MARE I.
Noumea
TROPIC OF CAPRICORN
20
Mt. Morgan
Sandy Cape
GREAT SANDY I.
Maryborough
Gympie
Roma
Toowoomba
Ipswich
Brisbane
Grafton
New England Range
Coolangatta
NORFOLK I. (Br.)
LORD HOWE I. (Br.)
Kempsey
Bathurst
Maitland
Newcastle
Tarramatta
Sydney
Goulburn
Canberra
Site of Federal District and proposed new capital
Mt. Kosciusko 7,308
Blue Mts.
Murray R.
Albury
Melbourne
C. Howe
TASMAN SEA
C. Wilson
Strait
30
North Cape
Auckland
NORTH ISLAND
Thames
Bay of Plenty
NEW ZEALAND
Mt. Ruapehu 9,175
East Cape
Gisborne
C. Farewell
Wanganui
Napier
Westport
Nelson
Palmerston North
Greymouth
Cook Strait
Wellington
Mt. Cook 12,349
Christchurch
SOUTH ISLAND
Timaru
Oamaru
Dunedin
Foveaux Strait
CHATHAM IS. (British)
STEWART I.
Invercargill
South Cape
40
150°
Greenwich
160°
170°
180°
L.L. POATES CO., N.Y.

Brown Bros.

FIG. 347. Cars loaded with soft coal at the mouth of a colliery in New Zealand

The Dominion of New Zealand

New Zealand is a self-governing dominion of the British Empire. The two main islands are equal in area to two medium-sized American states, but the population is only a little over 1,200,000, and is not increasing rapidly. Most of the people are of British descent, energetic, independent, and democratic.

The climate is temperate and oceanic, with ample rainfall almost everywhere. The islands are mountainous and slightly volcanic, but nearly two thirds of the area can be used for agriculture or grazing. New Zealand is one of the "new lands" and, like Uruguay and Australia, is largely a pastoral country. There are nearly twenty times as many sheep as there are people in New Zealand; and wool, mutton, sheepskins, and tallow form the largest group of exports from the Dominion. The second most important group is made up of cattle products, especially butter and cheese, nearly all of which is sent to the British Isles. More than seven eighths of the exports are animal products. There is a severe shortage of farm labor in New Zealand, as in all of the prosperous new countries.

Fig. 348. Sheep in New Zealand. (*U. S. Dept. Agr.*)

The mineral products are chiefly gold and coal, but their annual value is not equal to that of the country's butter. An interesting substance known as *kauri gum* is dug in lumps from the ground where ancient forests of the kauri pine once stood. It is used in the United States in the manufacture of high-grade

varnish, and is exported from New Zealand to the value of a million dollars or more a year.

The foreign commerce of New Zealand is exceptionally large per capita, and the general wealth and degree of general comfort is high. This little country has a larger foreign trade than Chile with three times as many people.

Exercise

1. Why does Australia as a whole have a very low rainfall?
2. Why are most of the agricultural land and most of the population near the east and southeast coast?
3. Why is so much of the used land of Australia devoted to grazing?
4. Why, in earlier years, were sheep raised in Australia more for wool than for meat? Why, in later years, has the raising of sheep for mutton been profitable while in earlier years it was not?
5. Why has it been possible for Australia to take first place in the world as a wool producer?
6. Why does the greater part of Australian wool go to London?
7. Why are there hardly any people of the colored races in Australia?
8. Why is the population of Australia so much smaller than that of the United States?
9. Why does the greater part of the export wool of the world go to Great Britain, the United States, and France?
10. Why are rabbits such a pest in Australia, but not in the United States? Why is this pest diminishing somewhat of late?
11. Why did the population of Australia increase rapidly in 1851 and soon after?
12. Why is there a considerable population in southwestern Australia?
13. Why are the coal deposits of Australia regarded as favorably situated?
14. Why is Australia equipped to become a manufacturing nation (several reasons)? Why has manufacturing not progressed far in New Zealand?
15. Why should you expect the commerce of Australia to be more largely with the British Isles than with any other country?
16. Why is it not to the advantage of Great Britain actively to encourage the upbuilding of manufacturing in Australia and New Zealand?
17. Why, in your judgment, do these self-governing dominions of the British Empire retain their connection with Great Britain when they might be independent?

CHAPTER XXXII

AFRICA

Geographical Reasons for the Backwardness of Africa

Europe and Africa Compared. — Two thousand years ago, when Rome was mistress of the world, the lands around the Mediterranean Sea constituted the most important part of the world. Still earlier, the lands and peoples on the African side of the Mediterranean — especially Egypt and Carthage — were more advanced in civilization than were those on the European side (Greece at one period excepted). While Europe was still the home of barbarians, North Africa was the seat of well-advanced civilizations. So far as an early start is an advantage, Africa had the advantage of a long lead over Europe, yet to-day there is hardly an independent country of any importance in all Africa, and most of the continent is ruled by European powers. Europeans and their descendants now dominate the world, while Africa is still the Dark Continent in more ways than one.

Contrasts between the Geography of Africa and of Europe. —

(1) Europe lies almost entirely in the temperate zone; Africa mainly in the torrid zone.

(2) Europe has practically no desert land; nearly half of Africa is desert or near-desert.

(3) The greater part of the land in Europe is devoted to agriculture; less than 2 per cent of Africa is so used, and probably not over 10 per cent will be for an indefinite period in the future.

(4) Europe has an exceedingly irregular coast line, with many deep indentations, many projections, and many offshore islands. Africa has about the most regular coast line of all the continents.

(5) Either because of climate or for other reasons, Europe is occupied by people of the white races, while the greater part of Africa is occupied by people of the dark races.

(6) The coast line and the other physical features of Europe have favored the introduction and exchange of ideas which push civilization forward, while the coast line and physical features of Africa seem to have done just the opposite.

The Effect of the Unfavorable Climate and Coast Line. — The greatest handicap under which Africa is placed arises from its climate. The northern two fifths of the continent is mainly a trade-wind desert, and the middle portion is tropical jungle, scrub, or grass land, where few white people care to live. The

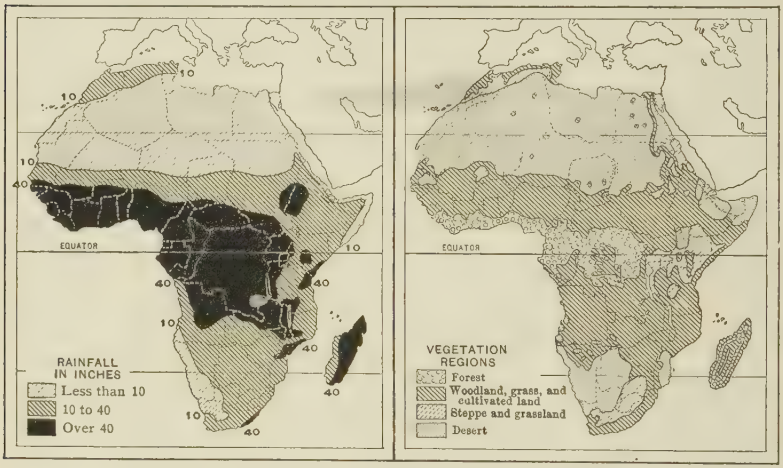

FIG. 349. Rainfall and vegetation in Africa.

southern end is in the temperate zone, but it is a rocky plateau, having too little rain for profitable agriculture, yet possessing great mineral wealth.

The coast of Africa for thousands of miles has hardly any protected bays or open river-mouths into which ships may freely enter. Nearly all of the rivers which flow into the sea have falls or rapids near the coast, and have never been of so much aid in penetrating the continent as large rivers usually are. The tropical coasts are dangerous to white men because of disease. So, on the whole, Africa has been an unfriendly continent.

Egypt and the Nile

Egypt. — Egypt is a land with a long history; a land with which we associate Joseph and Moses and the children of Israel; the land of the sphinx and the pyramids and the overflowing Nile. It has had many conquerors and many owners; but now for the first time in a long period it is essentially an independent country. How long it can continue so is uncertain, for the people are ill fitted for self-government. For hundreds of years it was misruled as a dependency of Turkey. After the building of the Suez Canal (and especially after 1883) British influence became ever stronger until the country became virtually, though not officially, a British possession; but in 1922 Egypt was given self-government and practical independence, although Great Britain continues to hold a privileged position in the country. About the only parts of Egypt that are habitable are the delta of the Nile and the narrow flood plain, from one to nine miles wide and nearly a thousand miles in length. Yet the population of Egypt is nearly equal to that of Belgium and the Netherlands combined.

The Nile and its Periodical Overflow. — The Nile heads in one of the equatorial lakes of Central Africa and flows more than 3000 miles northward into the Mediterranean; for 1600 miles its course is across the desert. From the east it receives two large tributaries that are fed for a part of the year by heavy downpours of rain, while for the rest of the year the region is nearly rainless. Thus the Nile flood gradually rises from June to September, and overflows the river's banks with remarkable regularity — though the height to which it rises varies considerably from year to year. The flood waters carry a rich yellow mud, which for centuries has added an annual film of fertility to the lands along its banks and has built a large delta out into the Mediterranean. Without the Nile and its fertilizing floods the desert would claim all of Egypt.

Old and New Methods of Irrigation. — For thousands of years the flood plain of the Nile depended upon the natural overflow of the river. In Upper Egypt the fields were inclosed in embankments which held the flood water for several weeks until the soil was thoroughly soaked; then the seed was sown in this muddy soil; it sprang up quickly and obtained enough moisture from the saturated ground to produce a crop. Under this system

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FIG. 350. A portion of the great dam across the Nile at Aswan, Egypt. The water flowing through gates or sluices near the bottom of the dam carries out with it some of the fertilizing Nile mud.

of "basin" irrigation only one crop a year could be produced; in years when the Nile did not rise so much as usual, the higher lands were not watered; possibly their owners obtained no crop at all, and suffering resulted.

After Great Britain came into control of Egypt, greatly improved irrigation works were built. The chief of these was the dam across the Nile near Aswan (Fig. 350), by means of which a large reservoir is made, and the flood waters of the Nile are stored, later to be released during the season of low water. This plan of "perennial" irrigation has replaced the older method in a large part of the Nile Valley, and now two or even three crops a year are raised on much of the land. Owing to the greater amount of food produced and to the growing prosperity of the country, the population has increased rapidly, and now the irrigated lands of Egypt support a larger agricultural population per square mile than any other region in the world. In all Egypt there are more people than in the five states bordering on the Gulf of Mexico.

Fig. 351. Cotton-producing regions, Egypt. (*U. S. Dept. Agr.*)

Crops. — The great fertility of the soil, the efficiency of the irrigation system, and the warm climate all combine to make the Nile delta and valley exceedingly productive in spite of the crude methods used by the Egyptian farmers. The crops upon which the dense farming population chiefly depends are four — cotton, wheat, corn, and clover, the last named being fed to the farm animals. Egyptian cotton commands a high price because of its long, silky fiber. This cotton is in great demand in England and America; it constitutes the most im-

portant money crop of Egypt and has a value four times as great as all the other exports combined. The prosperity of Egypt depends almost as completely upon cotton as that of Cuba does upon sugar. The very existence of the people depends upon the waters of the Nile, without which the desert would extend unbroken from coast to coast of Africa.

The Suez Canal. — The building of the Suez Canal between the Mediterranean and the Red Sea was one of the engineering triumphs of the last century. The Isthmus of Suez, which joins Asia and Africa, is a low, flat, sandy strip of land less than 100 miles across. If undertaken to-day with our advanced scientific knowledge and powerful machinery, the excavation of a ship canal at Suez would not be a difficult job; begun in 1859, it was a daring enterprise, an engineering feat of the first magnitude. Many eminent men believed it could not be done. But it was done in spite of all obstacles and in spite of the determined opposition of Great Britain, the nation which now controls the canal; and the credit is due to the great French engineer, Ferdinand de Lesseps. In 1869, after ten years of struggle and the expenditure of some $90,000,000, the canal was finished.

But complete success depended upon the all-important question, would ships use the canal and pay sufficient toll to meet the cost of operation and pay the interest on the great sum invested? The first year was disappointing; relatively few ships passed through, and the tolls collected did not pay expenses. The canal company was facing bankruptcy and again it looked as if the great enterprise would go down in failure as many had predicted. But it pulled through, and in 1872 over 1000 ships paid $3,000,000 in tolls. By 1875, 1500 ships paid over $5,000,000 in tolls. Then Great Britain changed her attitude, saw the great importance of the Suez route to her richest colony, India, and purchased a heavy interest in the canal from the Khedive of Egypt. In some periods 5000 ships a year have traversed the canal, and its earnings have amounted to nearly 25 per cent a year on the money invested. Complete control of the canal is now in British hands, and the British nation regards the canal as absolutely vital to the life of the British Empire. The effect upon commerce of this short cut to the East has been revolutionary.

Other Lands of Northern Africa

The Italian Colonies in Africa. — Adjoining Egypt on the west is the former Turkish province of Tripoli (mainly desert),

now controlled by Italy and called Libia. It has a narrow cultivated strip along the Mediterranean which is occupied by a settled population of less than half a million. In the desert are a number of oases with villages and gardens, and what remains of a once extensive caravan trade, for three of the most used of the caravan routes of the Sahara terminated in Tripoli. Italy has two additional colonies in Africa, one on the Red Sea coast and the other on the shore of the Indian Ocean, but they are not valuable (Fig. 353).

French Possessions in Africa. — West of Libia the Mediterranean coast of Africa—Tunis, Algeria, and most of Morocco—has come under French control. The French have also extended their control over more than half of the Sahara and have reached southward to the Gulf of Guinea (Fig. 353). France is now the holder of the largest colonial possessions in Africa, although a very large part of these possessions is of small value.

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FIG. 352. A white-robed native climbing a date palm in Algeria. Dates grow in a massive cluster near the top of the tree.

Algeria is regarded as an actual part of the French Republic and is treated as such; its population is more than one eighth

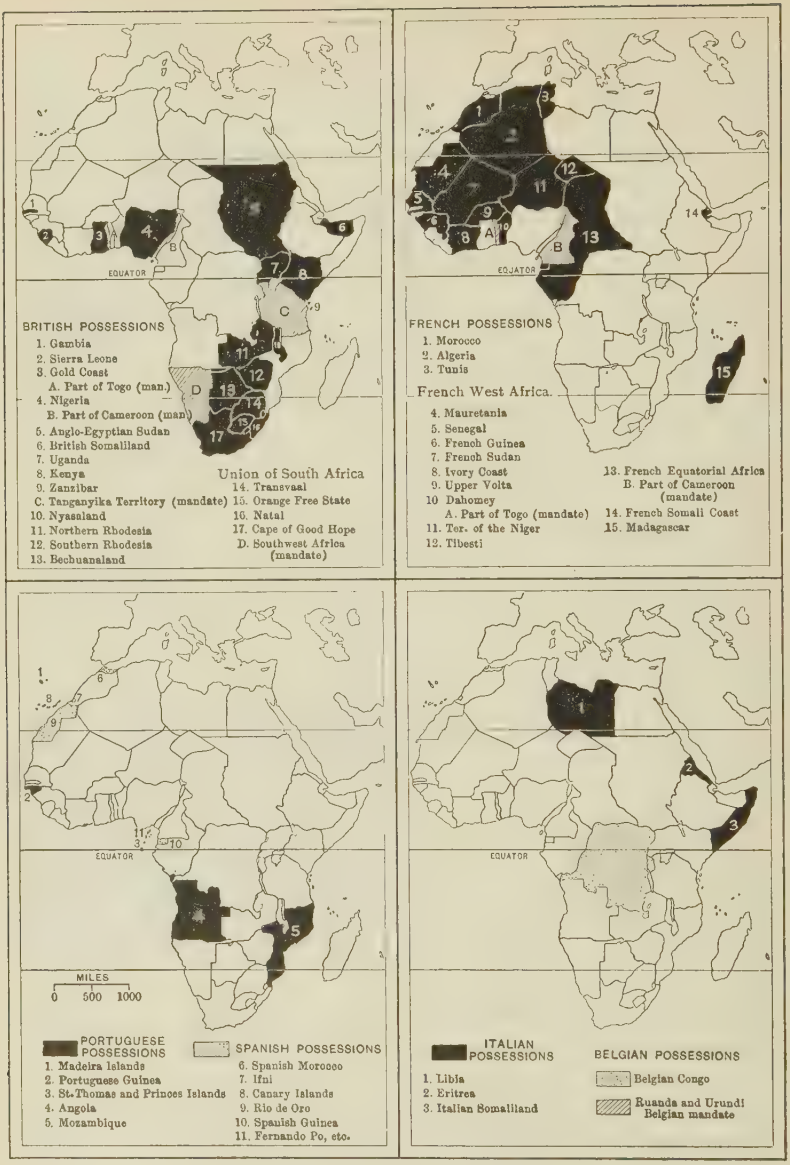

FIG. 353. European colonies in Africa.

that of France. The French have built railroads, telegraphs, port works, roads, and schools in the better parts of the country. Agriculture on the coastal strip is profitable, and large quantities of vegetables, grain, and fruit are sent to France. On the southern shore of the Mediterranean, as on the northern, olives are raised in great quantities.

Morocco is only partly subdued; the wild, marauding tribes resent control from outside, and a long time will be required to bring them under full subjugation so that the country may be developed.

The Oases of the Sahara. — The Sahara is not a mere sandy waste; in fact, only about one eighth of it is sandy. A large part is made up of rocky plateaus, with deep ravines and occasional depressions, some of which are below sea level. In these depressions the underground water either comes to the surface or is easily reached by wells. These are the oases; in some cases they are small and support only a few families; but in other cases they cover many square miles, even hundreds of square miles. Some of them are really groups of separate oases numbering ten or more, and the larger ones include many villages. The oases of Tafilet are said to include 300 walled villages, and the oases of Tuat are reported to include 300 to 400 petty states.

While various grains, vegetables, and fruits are grown in the oases, the all-important source of food is the stately date palm (Fig. 352), which grows by the million in these garden spots of the Sahara. The size and quality of a man's date gardens are the index to his wealth, and it is said that the best of these gardens command $5000 gold per acre. There are many varieties of dates; some are used for human food, and others are fed to the animals. When the caravan trade across the desert was in its prime, the oases were the meeting points of the caravan routes, and the more important ones were busy and prosperous centers; but the decline of the caravan trade has changed this.

The Caravan Trade of the Sahara. — As a rule the caravan routes extend north and south, connecting the Sudan with the Mediterranean coast. The trails are by no means distinct, and only experienced "pilots" can follow them. A caravan consists of a number of traders and travelers who join forces for safety against the robber tribes of the desert. They and their goods

are carried by camels, which may number several thousand for a single caravan. The draft camel, or *jemal*, carries an average load of 300 pounds forty or more miles a day. With the exception of three or four hours around midday, the caravan travels steadily day and night, but makes stops of several days at the principal stopping places. The two great dangers are the terrible sand storms and the robber tribes. At one time, many millions of dollars' worth of European products moved southward across the desert, and a nearly equal value of products from the Sudan and the oases moved northward. It is an interesting fact that a freight train of fifty cars can carry as much freight as a train of 10,000 camels, and a single ocean freighter can carry as much as 100,000 camels.[1]

Mr. Charles Furlong describes his experience with a *garfla*, or caravan, starting out from Tripoli for Murzuk, as follows:[2]

"Groaning, grunting, wheezing and bubbling, the last camel of the caravan was loaded . . . With my own Arabs I brought up the rear . . . The make-up of this garfla, as is usual with those bound for the interior, had required months of preparation, and was composed of many smaller ones which had delayed their time of departure in order to take advantage of the protection afforded by numerical strength. In its heavy loads were packed the heterogeneous goods generally taken, consisting of cotton and wool cloth, waste silk, yarn, box rings, beads, amber, paper, sugar, drugs, and tea, of which British cotton goods formed more than fifty per cent of the value. Besides these it carried some native products. Every autumn, caravans arrive from the interior and return with dried dates; for among the tribes of the Fezzan, Tripoli dates form the chief article of diet, and in the oases of the desert, dates chopped with straw are used as fodder.

"So one August night I found myself a part of the Saharan garfla, one of the vertebrae of a monster sand-snake, which wormed its way through the oases of Tripoli toward the Great Desert. I watched our garfla wind around or zigzag over the hills of sand, breaking and linking itself together again as it crawled its slow pace of three miles an hour. It marched in

[1] Read "The Caravan Trade of the Sahara," by Genivera Loft in the *Journal of Geography*, vol. 15, p. 221, Mar., 1917.

[2] From "The Gateway to the Sahara," by Charles W. Furlong. Used by permission of Charles Scribner's Sons, publishers.

irregular order, characteristic of the Arabs, stringing out for miles, but closing in together for protection against attack as night approached.

"We moved south. Passing caravans became scarce. A dust-cloud would appear in the distance, grow large, and a caravan of Bedouins would pass by. Sometimes I would ride forward with my dragoman, anticipating a longer rest by reaching a fonduk several hours ahead of the slowly-moving garfla. On one of these occasions, as we ascended a sand-hill the advance guard of a homeward-bound caravan suddenly loomed up before us. Eleven months before they had started from Kano, the first caravan to arrive from there for two years, owing to the general insecurity of the roads. Three months they had held over at Zinder and a month at both Air and Ghat. It took us all the afternoon to ride by the twelve hundred and twenty camels. They carried a thousand loads of Sudan skins, destined to find their way to New York for the manufacture of gloves and shoes; two hundred loads of ostrich feathers, and ten loads of ivory, besides rhinoceros horns, gum arabic and wax, valued all together at over two hundred and five thousand dollars. . . ."

Tropical Africa

The Sudan. — The extensive region of the Sudan, lying between the desert on the north and the tropical forests on the south, and extending east and west across Africa, is controlled partly by France and partly by Great Britain (Figs. 349, 353). It is a marginal zone of little rainfall on the northern edge and fairly heavy summer rainfall on the southern. The people are of mixed races, including negroes, Berbers, Arabs, Egyptians, Abyssinians, and others, but the vast majority are negroes. Some are nomadic and some are settled agricultural peoples, but all are far removed from the civilizing influences of the outer world.

Parts of the Sudan are suited to cotton growing, and both the English and the French have made persistent efforts to get this industry established. The English are the greatest importers of raw cotton among the nations, and are anxious to raise a greater amount of cotton within their colonies; but so far their efforts in the Sudan have met with little success, partly because the lack of transportation facilities prevents the marketing of the cotton at a reasonable cost.

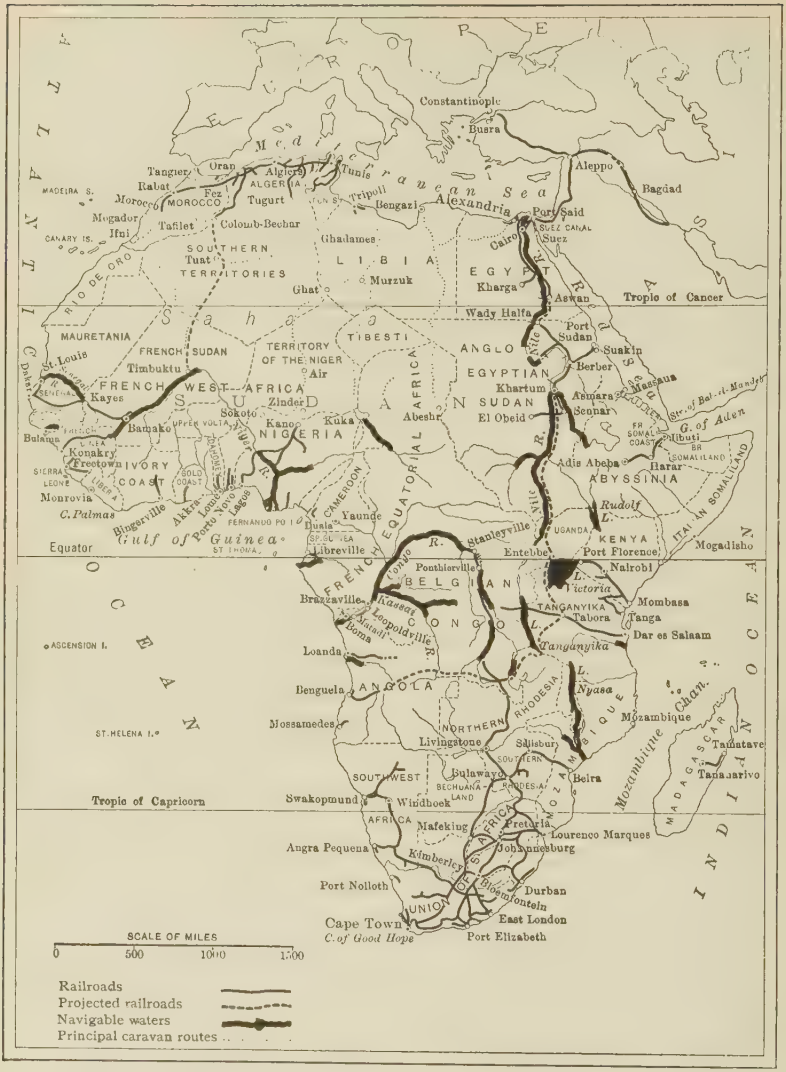

FIG. 354. Railroads, navigable rivers, and caravan routes of Africa.

Middle Africa. — Under the term "Middle Africa" is included a tropical belt about twenty-five degrees in width extending east and west across the middle of the continent. It is a region of great heat and generally heavy rainfall, and is partly covered with forests. It is inhabited by various negro tribes, most of whom have had at least a little contact with civilized peoples, and a part of whom are engaged in collecting or raising tropical products in an easy-going way. The Congo, the Niger, and the great lakes of Central Africa are the main water routes; a considerable number of railways reach inland from both coasts (Fig. 354), and the "Cape to Cairo" route extends north and south through the region.

Brown Bros.

FIG. 355. Cacao tree and pods in tropical West Africa.

In the heart of Middle Africa is the colony known as the Belgian Congo, which includes the basin of the Congo River. Around the Gulf of Guinea are a number of European colonies; they are developing a trade which already reaches into the hundreds of millions of dollars. The region known as the Gold Coast and two or three islands in the Gulf of Guinea form one of the leading cacao-producing regions of the world (page 311). West Africa abounds in a species of palm which yields the palm oil, used in Europe

and America in ever-increasing quantities; the yearly value of this product reaches into the tens of millions of dollars. Rubber from this region is no longer of much significance, and the ivory which was once a valuable item of commerce is now of minor importance. The eastern portion of Middle Africa is now almost wholly under British control, for, as a result of the World War, Germany lost all her African colonies.

East Africa, being more remote from Europe, is less developed than West Africa. Plantation agriculture has been attempted there by the Germans and the British, with only moderate success. White people can live and retain their health in Middle Africa by taking precautions, but the manual labor must be done by the natives, who are not ambitious.

South Africa

Geographical Conditions. — Great Britain and Portugal hold all of South Africa, the area of the British possessions being about twice that of the Portuguese (Fig. 353). For the most part the region is a plateau lying partly in the tropics and partly in the temperate zone, at an altitude of 4000 to 5000 feet, and receiving light rainfall; half of it is desert or near-desert. On the east and south the rainfall is sufficient for certain kinds of agriculture, but the greater part of the land that can be used at all is suited only to the grazing of sheep, goats, and cattle; really good pasture land is rare in South Africa. Owing to the high elevation and to the latitude, South Africa has a climate suited to white occupation, although the manual labor is done mostly by blacks.

The Mines of South Africa. — The wealth of South Africa lies in its minerals, — especially in its gold and diamonds. So great is their value that South Africa ranks fifth among the countries of the world in its production of minerals.

Gold. In 1884 the famous gold mines of the "Rand" were discovered, and rapidly rose to the position of the foremost producers of the world. California and Australia were outstripped, and in recent years the South African mines have produced two thirds as much of the yellow metal as

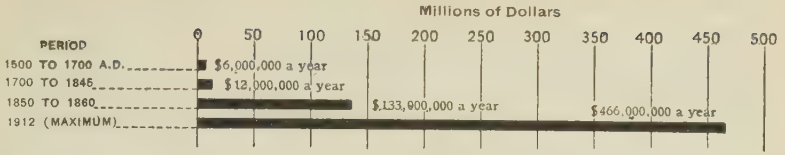

FIG. 356. The world's annual gold production.

all the rest of the world. Some sixty different mines are operating over a stretch of fifty miles in length. The ore is not especially rich, but it is exceptionally abundant, uniform, and dependable; each ton of ore from a given mine yields about so much gold, and the miner can count on it. The most efficient modern machinery is in use, and the operations are on a larger scale than in any other gold mines in the world. The Rand is in the Transvaal, in the vicinity of the city of Johannesburg, nearly 1000 miles by rail from Cape Town. The United States — the second country in rank in gold output — has produced as much as $100,000,000 of gold in a year; South Africa has produced double this amount. The mining of gold or diamonds is surrounded with a glamour which appeals to the imagination, and this gives an exaggerated impression of the value and importance of these minerals; but as a matter of fact, the single item of the annual corn crop of Iowa or the milk of Wisconsin is worth as much as the gold mined yearly in South Africa.

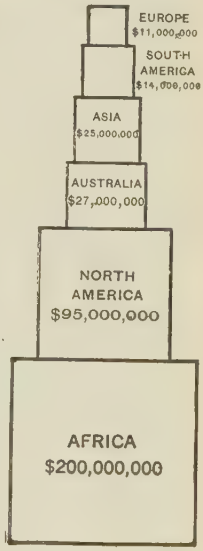

FIG. 357. Approximate average annual gold production, by continents.

Diamonds. Nearly all of the gem diamonds of the world now come from South Africa, and most largely from the mines in the vicinity of Kimberley. In the De Beers mines alone more than 10,000 native (colored) workmen are employed below ground. The diamonds are found in the "blue ground," in the throats or pipes of ancient volcanoes. This volcanic rock is mined, brought to the surface, spread on specially prepared areas called "floors," and allowed to weather or soften in the sun and air. After several months it softens and disintegrates sufficiently to go to the washing machines, where repeated churnings and washings finally separate the rough diamonds from the fine, earthy material with which they are mixed.

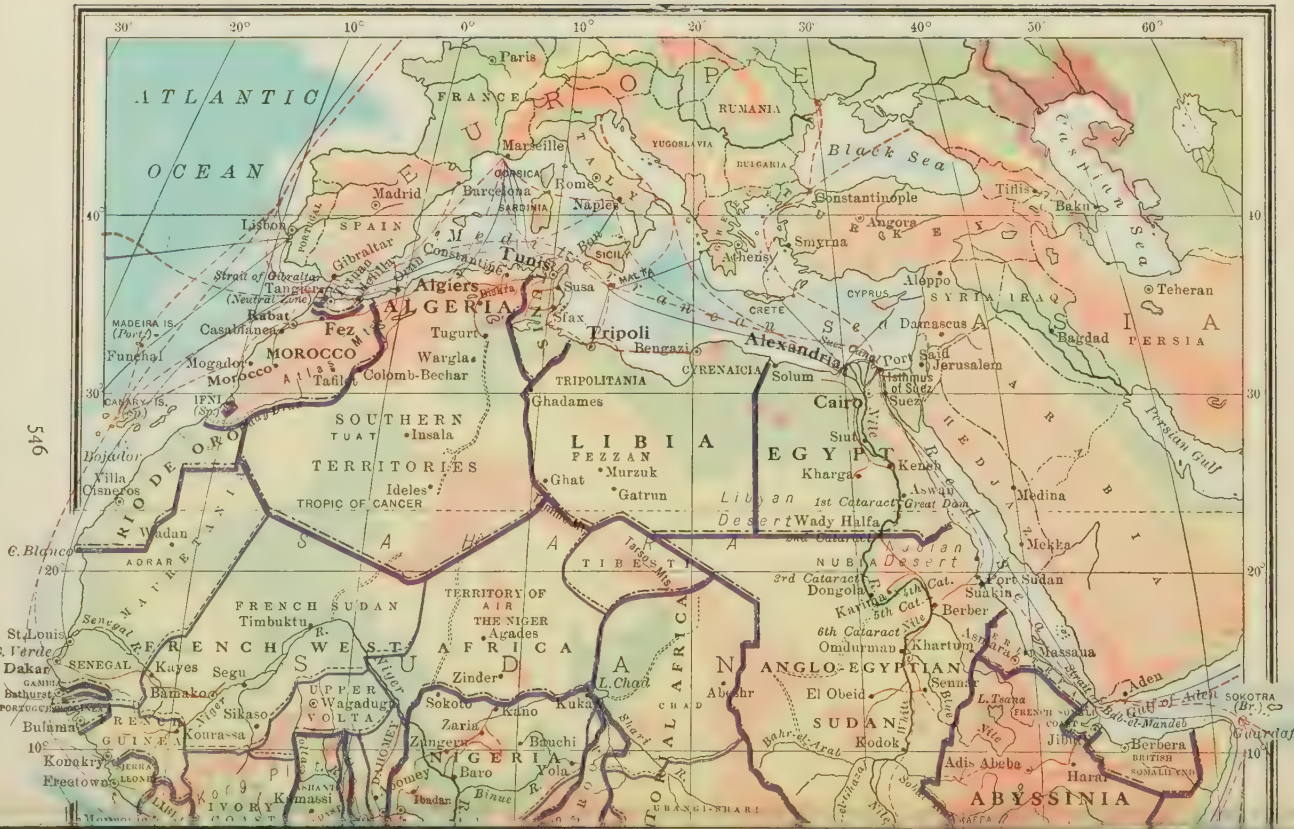
ATLANTIC OCEAN
EUROPE
ASIA
AFRICA
Paris
FRANCE
Marseille
Madrid
Barcelona
Lisbon
SPAIN
Gibraltar
Strait of Gibraltar
Tangier
(Neutral Zone)
Rabat
Casablanca
Fez
MOROCCO
Mogador
Morocco
Funchal
MADEIRA IS. (Port.)
CANARY IS. (Sp.)
IFNI (Sp.)
Tafilet
Colomb-Bechar
Algiers
ALGERIA
Tugurt
Wargla
Ghadames
Tunis
Susa
Sfax
Tripoli
Bengazi
TRIPOLITANIA
CYRENAICA
Alexandria
Solum
Cairo
Suez
Port Said
Ismailia
Isthmus of Suez
Jerusalem
Damascus
Baghdad
PERSIA
Aleppo
SYRIA
IRAQ
Teheran
Smyrna
Angora
Constantinople
Athens
Black Sea
Caspian Sea
Tiflis
Baku
CRETE
CYPRUS
RUMANIA
YUGOSLAVIA
BULGARIA
SICILY
MALTA
CORSICA
SARDINIA
Rome
Naples
Mediterranean Sea
Red Sea
Persian Gulf
SOUTHERN TERRITORIES
TUAT
Insala
Ideles
TROPIC OF CAPRICORN
LIBIA
FEZZAN
Murzuk
Ghat
Gatrun
Libyan Desert
EGYPT
Kena
Kharga
Siut
Aswan
1st Cataract
Great Dam
Wady Halfa
2nd Cataract
Nubian Desert
NUBIA
Medina
Mekka
Port Sudan
Suakin
Berber
3rd Cataract
Dongola
4th Cat.
5th Cat.
6th Cataract
Omdurman
Khartum
Massaua
Aden
Gulf of Aden
SOKOTRA (Br.)
Guardafui
Strait of Bab-el-Mandeb
Asmara
Keren
Kassala
Sennar
ANGLO-EGYPTIAN SUDAN
El Obeid
Kodok
Abeshr
L. Chad
L. Tsana
Jimma
Berbera
BRITISH SOMALILAND
Adis Abeba
Harar
ABYSSINIA
FRENCH SOMALILAND
Bahr-el-Arab
Bahr-el-Ghazal
Nile
Blue Nile
White Nile
Atbara R.
Sobat R.
Juba R.
Tana R.
Webi Shebeli
Webi Ganana
Lake Rudolf
Lake Stefanie
Lake Margherita
Lake Abaya
Lake Zwai
Lake Tsana
Lake Rudolf
Lake Albert
Lake Edward
Lake Kivu
Lake Tanganyika
Lake Victoria
Lake Nyanza
Lake Kioga
Lake Mweru
Lake Bangweolo
Lake Nyasa
Lake Rukwa
Lake Shirwa
Lake Chilwa
Lake Ngami
Lake Dilolo
Lake Leopold II
Lake Mai-Ndombe
Lake Kamalondo
Lake Kisale
Lake Upemba
Lake Kamalondo

Fig. 358

AFRICA

SCALE OF MILES

0 200 400 600 800 1000

ELEVATIONS IN FEET	DEPTH IN FATHOMS
Over 5000	0 to 100
2000 to 5000	100 to 1000
1000 to 2000	1000 to 2000
Sea Level to 1000	Over 2000
Land below Sea Level	

Principal Railroads

Principal Steamship Routes

Submarine Cables

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FIG. 359. Sorting diamonds from the South African mines.

After this process, however, the diamonds are still mixed with other pebbles and rock fragments, from which they must be separated. After much experimenting, it was found "that diamonds, of all the minerals contained in the blue ground, will adhere to grease and that all others will flow away with the tailings." Tables are thickly smeared with grease and are kept vibrating. The miscellaneous collection of pebbles and rock fragments to be sorted is fed upon these vibrating tables, and the diamonds are caught and held by the grease. This ingenious sorting method is far more sure than the most experienced eye.

The chief diamond mines are owned by a very few companies, and the industry is virtually controlled by one company. The diamonds are supplied to the market at a rate that falls just below the demand, and thus the prices are kept gradually advancing in the world's market. The rough diamonds are sent to Amsterdam, Paris, New York, and a few other cities, but especially to Amsterdam, where skilled cutters convert them into sparkling gems.

Ostrich Farming. — Ostrich farming is carried on with moderate success in several parts of the world; for example, in Arizona, New Zealand, and Australia. South Africa, however, is the land in which most of the domesticated ostriches of the world are raised, and in 1911 there were over a half million birds on the many ostrich farms of this colony. Before the World War the exportation of ostrich plumes from South Africa reached $15,000,000 a year, or a third the value of the diamonds exported. The wing and tail feathers supply the valuable plumes. The feathers are carefully plucked, and a healthy bird may go on producing new feathers for fifty years or more. The birds are treated gently, fed generously, and tended carefully, for only under such conditions do they yield the highest-grade plumes. The industry is profitable if the fashions in Europe and America are favorable. But "Fashion is a fickle dame" and for this reason the industry may be at the height of prosperity at one time, with plumes in demand at high prices, and a few years later it may be all but ruined by a change of fashion.

The Cape to Cairo Route. — Cecil Rhodes, the great empire-builder of South Africa, conceived the idea of a future Africa "red (British) from the Cape to Cairo" and bound together by a line of steel — the much-talked-of Cape to Cairo railroad. By the treaty of Versailles made at the close of the World War, Great Britain came into possession of German East Africa, and this gave the British another link in the chain of possessions extending from north to south in Africa. Now the continent is "red" almost from end to end. The Cape to Cairo railroad is not completed, and probably will not be for a long time to come; but an established route — nearly two thirds by rail — is now in use (Fig. 354).

Trains with dining and sleeping cars run northward from Cape Town nearly 3000 miles, requiring nine days for the journey. Through Central Africa the route continues by river steamer and by rail, about twelve days; thence overland by trail and road to the Nile, about two weeks; thence by river steamers, motor, and railroads to Cairo, about three weeks. The 7000-mile journey was completed in about eight weeks in 1922. Two important side routes extend out to the east and to the west; the former by rail to the Indian Ocean, and the latter by steamer on the Congo and by rail around the rapids of this river, to the Atlantic. Thus the heart of Africa is reached from east, west, north, and south.

Commerce Between the United States and Africa. — The international commerce between Africa and the rest of the world is smaller than that of any other continent except Australia. Very little of Africa is developed; there are relatively few white people, and the productive power of the natives is small. The amount of a country's foreign trade depends upon the stage of civilization of the people; the more advanced they are, the greater their wants and the greater their capacity to produce products to be given in exchange for imported goods.

Naturally the African colonies trade most largely with their respective mother countries. Great Britain dominates the trade of the British colonies, and France of the French colonies. Nevertheless, the United States has increased its commerce with Africa to a respectable sum. Three fourths of the value of all the cotton we import comes from Egypt. We buy as many as 30,000,000 gallons of palm oil a year from West Africa, and from this same region we buy more cacao than from any other part of the world. We import from $50,000,000 to $100,000,000 worth of diamonds a year, and practically all were originally mined in South Africa, though we buy most of them through Holland and England. We buy more goods from Africa than we sell to that continent. Africa is, in the main, a buyer of manufactured goods, and in the sale of these, the European countries that own these colonies have an advantage over the United States.

Summary

In its physical features and climate Africa is the most unfortunate of the continents. With the exception of the narrow flood plain of the Nile and a strip along the Mediterranean in Algeria and Morocco, practically all of the northern part of the continent is a desert, with oases here and there.

Egypt has been given self-government, but its relations with Great Britain will necessarily remain close. By means of great modern irrigation works the Nile Valley and its delta are made exceedingly productive. Egypt supplies the cotton-manufacturing nations with high-grade Egyptian cotton.

The Suez Canal, built by the French engineer, Ferdinand de Lesseps, is 100 miles long; it is now controlled by Great Britain, and is regarded as one of the essential ties that bind the British Empire together. Italy controls Tripoli (now called Libia) and two other unimportant colonies in Africa. France controls Tunis, Algeria, most of Morocco, the greater part of the vast Sahara, tropical colonies in the Sudan and in West Africa, and the large island of Madagascar. The French possessions form an area much larger than the United States, and are larger than the British holdings in Africa. These colonies are not at present highly valuable, but they are improving, and eventually may justify the confidence that France has in them. Algeria is treated as a part of the French Republic, and is the most valuable of the French possessions in Africa.

The Sudan — controlled partly by Great Britain and partly by France — is a tropical belt lying between the Sahara and the jungle of Central Africa. It is capable of agricultural and pastoral uses, but the high cost of transporting products to the coast retards its development. Middle Africa is intensely tropical. The Belgian Congo occupies the great forest-covered basin of the Congo River. From the west coast large quantities of palm oil and cacao are sent. The ivory, rubber, and mahogany, of which much has been written, really amount to only a small annual value.

Portugal has two large colonies in the southern half of Africa, but the largest and best part of this extensive region belongs to Great Britain. The Union of South Africa is a self-governing dominion of the British Empire. It produces 40 per cent of the world's gold and practically all of its diamonds. The people are of three quite distinct groups: (1) The British, who control the mines and most of the business interests; (2) the Boers, of Dutch descent, who are mainly farmers and live-stock raisers; and (3) the native blacks, who greatly outnumber the whites and who do the greater part of the manual labor, especially in the mines. The country is high, dry, and temperate; little of it is suited to agriculture; the grazing of sheep, goats, cattle, and

ostriches forms the principal rural industry. The Cape to Cairo railroad — the dream of Cecil Rhodes — is nearly two thirds completed. Cape Town in Cape Colony, Johannesburg in the gold-mining region, and Kimberley in the diamond fields, are the best known cities. With the exception of (1) the little negro republic of Liberia on the west coast, (2) Abyssinia in the northeast, and (3) Egypt, all of Africa belongs to European nations — mainly to Great Britain, France, Portugal, Belgium, and Italy. The backwardness of the native peoples and the unfavorable climate have greatly retarded the development of Africa and must continue to do so. The United States is a large buyer of Egyptian cotton, of palm oil, and cacao from the west coast, and of diamonds and ostrich plumes from the south. Our sales to Africa are relatively small, but they are growing.

Exercise

1. Why is Africa appropriately called the Dark Continent?
2. Why is the geographical situation of Africa unfavorable?
3. Why has the character of the coast line of Africa been a hindrance to the development of the continent?
4. Why does the northern part of Africa receive so little rainfall? (Consult a textbook of Physical Geography.)
5. Why did the rivers of Africa aid but little in the exploration and development of the continent?
6. Why do the waters of the Nile rise and subside regularly each year?
7. Why is the rise of the Nile of utmost importance to Egypt?
8. Why is the new method of irrigation, which is made possible by the Aswan Dam, superior to the old system of basin irrigation?
9. Why does Egyptian cotton command a high price?
10. Why was the building of the Suez Canal less expensive than the building of the Panama Canal? (See page 293.)
11. Why was the building of the Suez Canal an event of world-wide importance?
12. Why does Great Britain now consider it necessary to control this canal?
13. Why is the Suez Canal a more profitable financial enterprise than the Panama Canal? (Consider cost.)

14. Why may the African colonies on the Mediterranean be regarded as more desirable than most other African colonies?

15. Why do oases occur here and there in the Sahara? Why are they important?

16. Why is the camel the chief freight carrier of the desert?

17. Why is the caravan trade attended with much danger?

18. Why are the English especially desirous of establishing cotton-production in some of their colonies? Why does it not succeed well in the Sudan?

19. Why is West Africa better situated for overseas trade than East Africa?

20. Why is Central Africa difficult to penetrate? What does it produce?

21. Why is South Africa more attractive climatically than Central Africa?

22. Why is agriculture not very successful in South Africa? Why is grazing more successful?

23. Why are the South African gold mines regarded as the most valuable in the world? Where are they?

24. Why — in spite of the great quantity of diamonds in South Africa — does the price of diamonds steadily advance?

25. Why is it that the United States is the largest market for diamonds among the countries of the world?

26. Why is the Cape to Cairo railroad slow in reaching completion?

27. Why is it less likely to be financially profitable than a railroad across the United States or Canada?

28. Why is the United States at a disadvantage in selling its products in Africa?

29. Why do we buy more from Africa than we sell to it? What do we buy there?

30. Why are there so few independent countries in Africa? Compare with other continents in this respect.

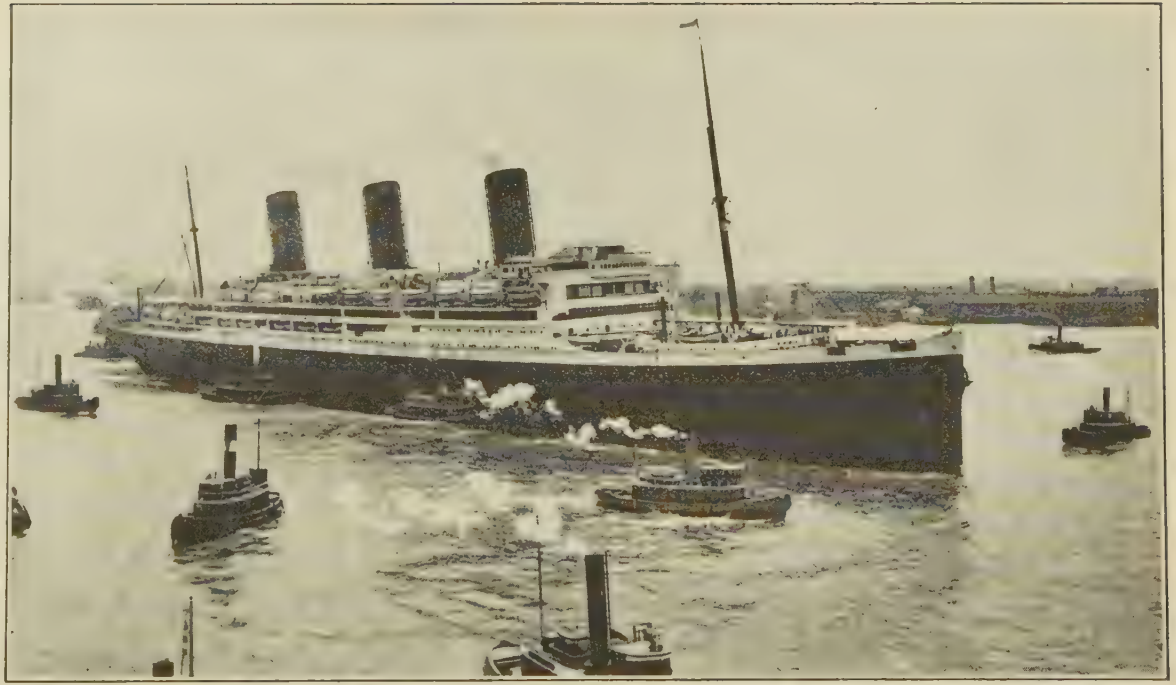

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FIG. 360. The steamship *Majestic* in New York harbor. This is one of the largest steamships afloat — 956 feet long. It has a carrying capacity of over 5000 persons, including a crew of 1700. Only on the North Atlantic route between Europe and the United States can such ships be profitably maintained.

CHAPTER XXXIII

CHIEF PRODUCING REGIONS AND WORLD TRADE

(A Summary)

Regions of Large Agricultural Production

The Monsoon Lands of the Far East. — The greatest production of crops per acre is achieved in China and Japan, and to a somewhat smaller extent in India and Java, all of them regions of heavy rainfall during the warm season, and densely populated. Probably the great number of people in these countries is due to their enormous food-producing power. However, the population is so large that almost all the food produced is required at home; consequently these monsoon lands do not supply much food to other parts of the world. In fact, the importation of food probably equals or exceeds the exportation.

Western Europe. — Less than half the land of Great Britain, France, Germany, and other countries of western Europe is suitable for farm crops; but by intelligent methods, by the use of machinery, by raising live stock, and by great industriousness, the peoples there are able to produce huge quantities of food. However, no country of western Europe produces enough food for its own needs, but must import additional supplies from eastern Europe and from the newer and less densely populated countries overseas.

Eastern Europe. — Russia, Rumania, Poland, and Hungary have been the great European producers of foodstuffs for export, for they are agricultural lands largely made up of fertile plains. Their methods of agriculture are somewhat backward, and the average yield of crops per acre is rather low, yet the total amount of food produced is large. It is not sufficient, however, fully to supply the needs of the industrial nations of western Europe, and these nations buy heavily also from North and South America, Australia, and elsewhere.

Central Plains of North America. — The central plains of North America are of high fertility and great extent, reaching from the Gulf of Mexico to central Canada, and from the Appalachians to the Rockies, a total area of some 2,000,000 square miles. Throughout this region the rainfall comes mainly in the spring and summer, when it can do the most good, and only on the western margin of the region is it insufficient for crops. This is the greatest cereal and live-stock region of the world. Corn, wheat, oats, and meat are the outstanding productions, while the southern portion is the world's greatest source of cotton. Not only do these central plains produce food for the millions of city dwellers in the United States and Canada, but they send more foodstuffs to the crowded countries of western Europe than does any other part of the world. It is a region of extensive and intelligent agriculture, using farm machinery of the most modern type. The production per acre is not high, but the production per man is exceedingly high. From Canada and the United States more than 500,000,000 bushels of wheat are annually shipped, and half as many bushels of other cereals; and more raw cotton is exported from the United States than from all other countries combined. If sufficient farm labor could be secured, the central plains of North America could produce vastly more than they are now producing; and as the demand for its products increases, the production will continue to be increased by the more effective use of machinery.

Plains of Temperate South America. — Another of the regions of the temperate zone where a large and fertile area is occupied by a sparse population is the pampa of Argentina and the plains of Uruguay, one of the great cereal and live-stock regions of the earth. The area is smaller than the Russian plain or the North American plain; but the population is so small that it consumes a relatively small part of the foodstuffs that it produces. In proportion to population this region is one of the very foremost exporters of foodstuffs, including wheat, corn, mutton, and beef. It is also one of the important sources of wool, hides, and sheepskins. The rainfall is not entirely ade-

quate, and locusts are a plague, yet the region is capable of yielding several times its present volume of products. Europe is the largest buyer, although the United States imports considerable quantities of wool and hides from these lands.

Australia and New Zealand. — Though Australia and New Zealand have a smaller productive area and smaller population than any of the regions previously named, they require mention as producers of export wheat, wool, meat, and dairy products. The productions of New Zealand are limited by its small area and those of Australia by scanty rainfall.

The Tropics. — Because of abundant heat and rainfall, tropical lands are capable of yielding certain foodstuffs in great quantities. Relatively little has been done in the study of tropical agriculture, but there is no doubt of the enormous food-producing possibilities of these lands. The tropics do not produce wheat, rye, barley, or corn so well as do the temperate zones, but they produce rice, sugar, bananas, cacao, copra, and a long list of other foods. Some authorities believe that in the future we must look to the tropics for a greatly increased proportion of the world's food.

Principal Articles of Commerce

Chief Items of International Trade. — In order that a commodity may become one of the great items of world commerce,

(*a*) it must supply a want felt by many people;

(*b*) it must be capable of being handled, stored, and shipped long distances without serious deterioration;

(*c*) it must be suited to production, shipping, and marketing at reasonable cost.

Naturally, items of food and clothing make up a large part of international commerce; and among the many kinds of food and of clothing materials, those which are most serviceable, least perishable, and cheapest take leading positions. The chief imports and exports of the various countries differ considerably, depending to a large extent upon the natural products of the country and its stage of development. Considering the countries of

western Europe, it will be found that the following products enter extensively into commerce:

Wheat and other grains
Cotton and cotton manufactures
Wool and woolen manufactures
Iron and steel products
Wood products
Hides, skins, and leather products
Meats and dairy products
Rubber and rubber goods
Beverages — tea, coffee
Copper and copper manufactures
Petroleum and its products
Jute, hemp, sisal, and other coarse fibers
Coal and coke.

In the case of the United States, the list is only slightly different:

Leading imports

Raw sugar
Raw silk
Coffee
Hides and skins
Rubber
Raw wool
Raw cotton

Leading exports

Cotton and cotton goods
Iron and steel products
Wheat and flour
Meat and dairy products
Petroleum and its products
Tobacco
Wood products

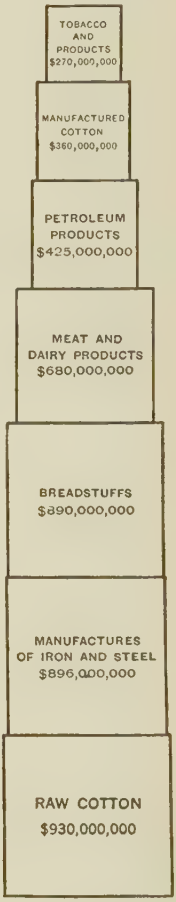


FIG. 361. Imports. FIG. 362. Exports.
Principal imports and exports of the United States: average for 1919–1921.

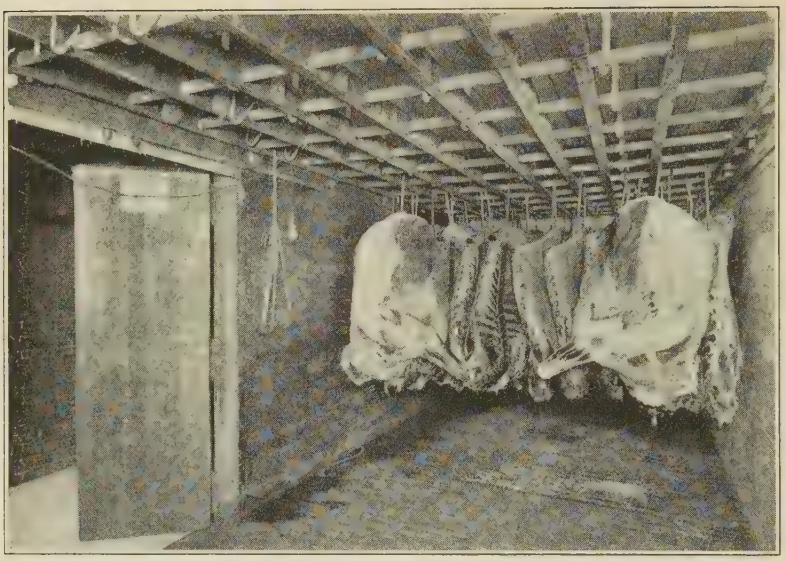
Important Products that do Not Enter Largely into International Trade. — *Rice* is one of the two chief foodstuffs of the human family, wheat being the other. A larger percentage of the wheat that is grown enters international commerce than of any other cereal, but a smaller percentage of rice; about 85 per cent of the rice crop is consumed in the countries where it is grown. About 97 per cent of the world's rice is grown in the Orient — India, China, Japan, Indo-China, and the East Indies; and almost all of it is consumed there.

Potatoes are one of the great food crops of Europeans and Americans. In weight they are the greatest of the world's food products. Ninety per cent of the potatoes of the world are raised in Europe, and half of these are raised in Germany and Russia. Scarcely 2 per cent of the potatoes grown enter international commerce; in other words, 98 per cent of the potatoes grown are consumed in the countries that produce them. They are too bulky, perishable, and cheap to be shipped long distances, although considerable quantities are shipped across international boundaries in Europe.

Oats and *corn*. About 70 per cent of the world's corn is grown in the United States, and 12 or 14 per cent in Europe; 95 per cent of the world's oats are grown in North America and Europe. Only 8 or 10 per cent of these two great crops enter into international commerce. They are much less perishable than potatoes, but (at least in the countries ill supplied) they are not sufficiently valuable in proportion to their weight to justify shipment very far.

Rye and *barley* together do not equal the wheat, rice, or corn crop of the world; and neither rye nor barley is exported to any large extent from the countries that produce it.

Thus, of seven great food products, only one — wheat — is highly important in international commerce; and less than 25 per cent of that is exported from the countries where it is produced. It is evident that these commodities are vastly more important as articles of production and of internal commerce than they are as articles of foreign commerce.



Brown Bros.

FIG. 363. Beef hanging in a refrigerator car.

Meat. In the diet of Americans, West Europeans, and some other peoples, meat (chiefly beef, pork, and mutton) is regarded as an essential article. The United States is the greatest producer of beef and pork; Germany, Russia, France, Great Britain, Argentina, Australia, and Canada are other important producers and consumers. People of the Orient and of the tropics use little meat. The Chinese and Japanese do not use it because, with their dense population, they cannot afford to devote land to animal raising; the Hindus do not use it because of religious objections and also because of poverty. Very few countries export much meat. The United States and Canada, Argentina and Uruguay, Australia, New Zealand, and little Denmark supply most of the export meat of the world. All but 3 or 4 per cent of the world's supply of meat is consumed within the countries that produce it.

Dairy products. Milk, cheese, and butter are among the important human foods, due in part to their richness in vitamins.

The money value of dairy products in the United States reaches beyond a billion dollars a year. Dairy products are important in nearly all European countries, and in Canada, Australia, and New Zealand, but not in China or Japan or the tropics. Condensed milk, butter, and especially cheese, enter international commerce in considerable quantity, yet the quantity is a very small fraction of all that is produced. Only four countries are normally large exporters of butter — Denmark, Russia (including Siberia), the Netherlands, and Australia. After 1917 Russia ceased to be important, while Sweden and Finland have to some extent taken its place. Canada, the Netherlands, Switzerland, and Italy are the leading exporters of cheese. It is a significant fact that more than half of all the butter and cheese exported from all countries is consumed in Great Britain. Though the United States is by far the largest producer of butter and cheese, it exports very little, only about a twentieth as much as the Netherlands, for example.

Principal Articles of International Trade

Wheat. — Of all the cereals, in fact of all the foodstuffs of world trade, wheat and its flour stand unrivaled. Among the continents Europe is the leading wheat producer, partly because it is the most populous continent where people commonly eat white bread. Western Europe with its great manufacturing cities and dense population raises too little wheat for its own requirements, although France is the second among European wheat-raising countries. Russia, Rumania, and Hungary raise a surplus of wheat for export to other parts of Europe. The United States is the leading wheat-growing country, but consumes from 70 to 80 per cent of the crop at home. Canada with its large area and small population produces only about one third as much wheat as the United States, but in some years exports fully as much. Argentina, Australia, and British India are the other large exporters. In spite of the fact that wheat is the foremost foodstuff of international trade, less than one fourth of the wheat produced enters into such trade. But if this fourth

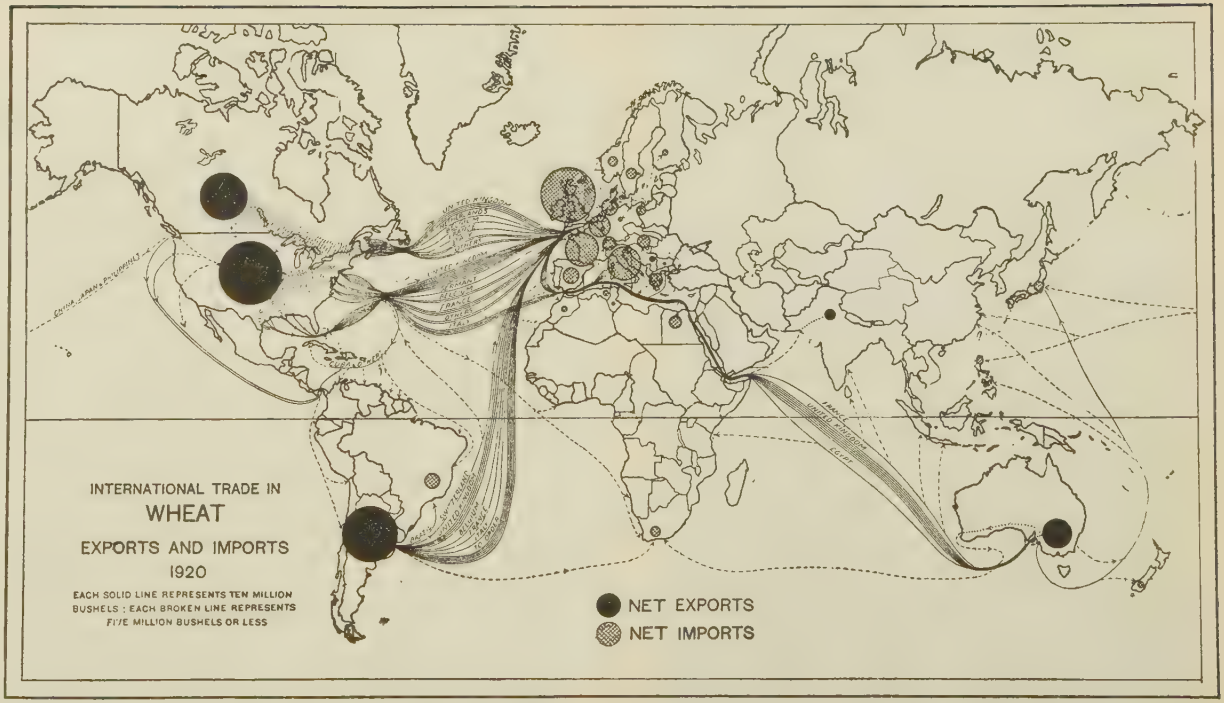
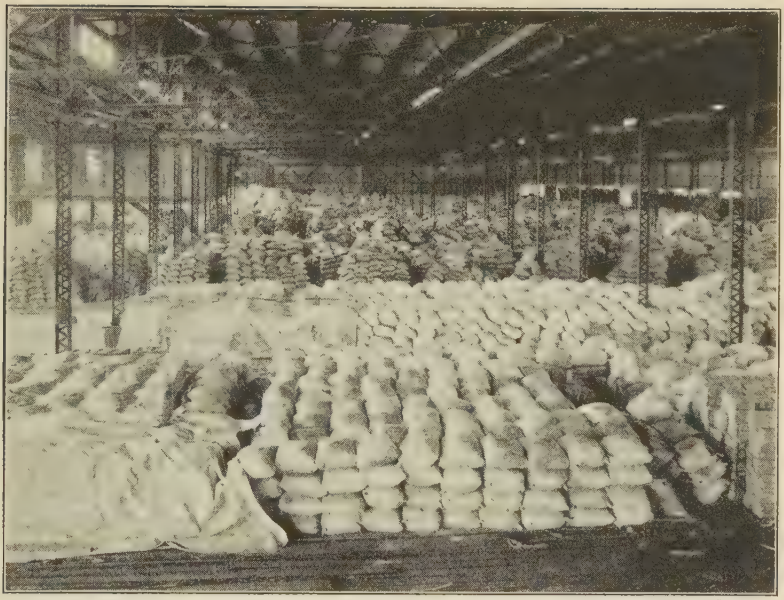

INTERNATIONAL TRADE IN
WHEAT
EXPORTS AND IMPORTS
1920
EACH SOLID LINE REPRESENTS TEN MILLION BUSHELS ; EACH BROKEN LINE REPRESENTS FIVE MILLION BUSHELS OR LESS
NET EXPORTS
NET IMPORTS

FIG. 364. International trade in wheat after the World War, showing surplus production, trade routes, and destination. India in most years has a larger surplus. In normal times, also, Russia and Hungary have a surplus for export. (*U. S. Dept. Agr.*)



Ewing Galloway

FIG. 365. Interior of one of the municipal piers at New Orleans, showing flour ready for export.

(about 900,000,000 bushels) were shipped in carloads of 600 bushels each, and a car passed you every twenty seconds, nearly a year would be required for this wheat train to go by. The export wheat of the world comes mainly from the broad plains of the newer countries, where land is relatively cheap, and where the most efficient machinery can be used. A little of it goes to the tropics, but 90 per cent of it goes to the densely peopled industrial countries of Europe.

Sugar. — Before the World War, nearly half of the world's sugar was made in Europe from sugar beets, and about half in the tropics from sugar cane. Germany, Russia, and Austria-Hungary were the leading countries in the production of beet sugar. The war temporarily crippled the beet sugar industry of Europe, and for several years afterwards cane sugar supplied

a great deal more than half of the demand. Sugar beets are produced mainly in regions (1) where the climate is cool and moist, (2) where the land is level and rich, (3) where labor is abundant, and (4) where skilled chemists, engineers, and business managers for the factories are available. In the United States, the greater part of the sugar beets are raised on irrigated land, but this is not the case in Europe.

Sugar cane is produced largely on tropical islands where land and labor are relatively cheap. Nearly all this sugar is sent in the raw condition to be refined in the temperate countries where higher-grade labor and trained specialists are to be found; there are very few sugar refineries in the tropics. In the production of cane sugar, Cuba leads all other countries, followed by India, Java, the Hawaiian Islands, Porto Rico, and the Philippines.

Sugar is one of the chief products of international trade. Practically half of all that is produced is exported to other countries. It is compact, ships well, keeps well, is relatively valuable, and the demand for it is not seasonal or subject to the whims of fashion. It is really one of the great foods for humankind; in total food value the world's sugar crop ranks next after wheat and rice. The United States and the United Kingdom import as much sugar as all the rest of the world, and their people consume 90 pounds or more per capita each year.

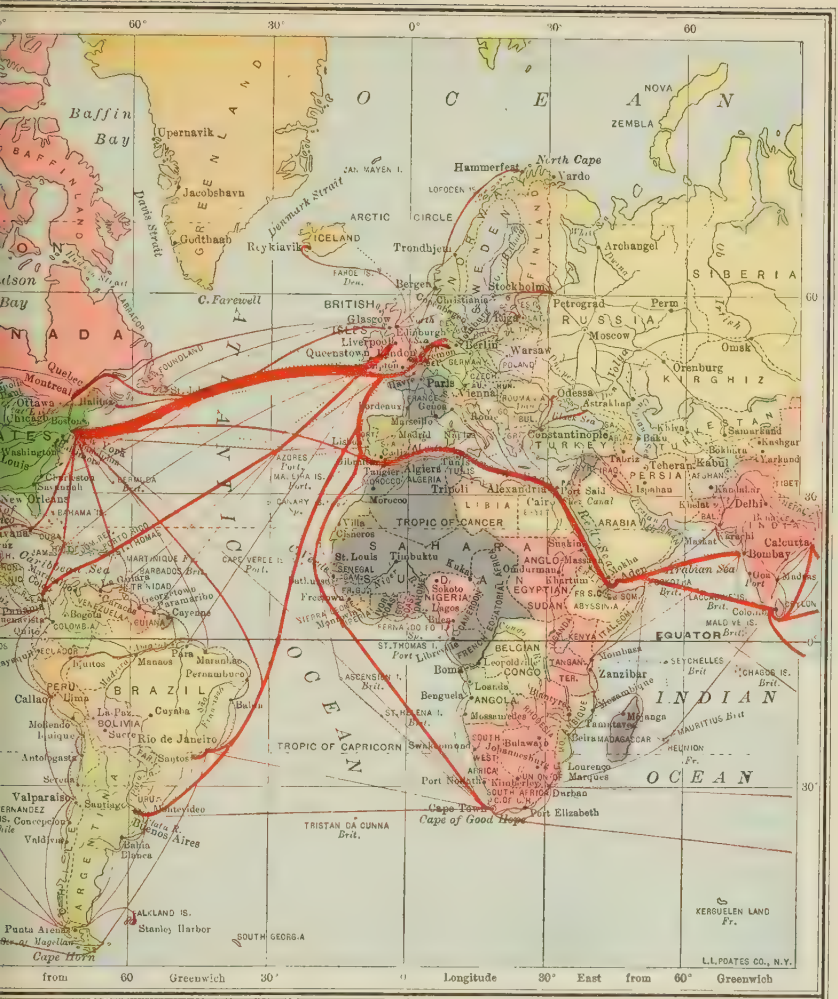
Coffee and Tea. — Nearly all the world's coffee is grown on hill and mountain land in the moist tropics, mainly in Latin America. It is at its best when grown on the soil formed by the decay of igneous rocks rich in iron, well drained, and at a considerable altitude. Southeastern Brazil provides about 70 per cent of the world's coffee, and most of the remainder is grown in countries surrounding the Caribbean Sea. The amount grown in Java, Ceylon, Arabia, and other eastern countries is no longer important. This is one of the rare instances in which Latin America has been able to wrest an established industry from the Far East, where labor is so plentiful and so

cheap. The people of the United States are the greatest of all coffee users; they consume nearly half of all that is produced. It is an interesting fact that the people of the British Isles and their descendants in the colonies drink tea in preference to coffee, while the Americans drink relatively little tea and much coffee.

China was at one time the greatest of the tea-exporting countries. But the Chinese methods are old-fashioned and inefficient, and now India and Ceylon, where the plantations are largely under British management, are the leading exporters of tea; China, Japan, and the East Indies are the other sources. Tea grows in a tropical or warm temperate climate on well-drained hillsides. The crop requires much hand labor, and so belongs peculiarly to the populous Orient. The British Empire and Russia consume the greater part of the export tea of the world.

Hides, Skins, and Leather. — Cattle, goats, and sheep supply the hides and skins from which most of the leather of commerce is made. Naturally, the countries which raise great numbers of these animals are the active exporters of hides and skins. A large proportion of those produced in Europe and the United States are tanned and used within those industrial countries. The largest export movement is from Argentina, Uruguay, Australia, New Zealand, and South Africa, for cattle hides and sheepskins; and from China and India for goatskins. These are countries in which the chemical industries, which include tanning, are little developed, and therefore the large surplus of hides and skins moves to the industrial countries, and a part of the leather manufactures made from them are resold to the countries from which the raw material originally came. The United States, Germany, France, and Great Britain manufacture the greater part of the leather goods of the world. It is estimated that less than half of the people of the world wear leather shoes; if all the people were to wear them, there would not be hides and skins enough to supply the demand for leather.

ARCTIC
SIBERIA
NEW SIBERIA IS.
WRANGELL I.
Pt. Barrow
ARCTIC CIRCLE
Bering Sea
ALASKA
Fairbanks
St. Michael
Valdez
Seward
Skagway
Sitka
Dawson
Dutch Har.
ALEUTIAN IS.
Prince Rupert
Edmonton
Vancouver
Victoria
Seattle
Portland
San Francisco
Los Angeles
Honolulu
HAWAIIAN IS.
Tomsk
Irkutsk
Kiakhta
Maimatchin
MONGOLIA
MANCHURIA
Nikolaievsk
Vladivostok
Peking
Tientsin
Singan
Kiaochau
Hankow
Foochow
Canton
Shanghai
Yokohama
Tokio
Nagasaki
Seoul
Fusan
JAPAN
HONSHU
HOKKAIDO
TIBET
CHINA
TROPIC OF CANCER
Calcutta
Madras
Bombay
Hongkong
Manila
PHILIPPINE ISLANDS
LADRONE IS.
WAKE I.
GUAM
MARSHALL IS.
CAROLINE ISLANDS
PELEW IS.
Singapore
Batavia
JAVA
SUMATRA
BORNEO
CELEBES
EQUATOR
NEW GUINEA
NEW IRELAND
SOLOMON IS.
PHOENIX IS.
FANNING I.
CHRISTMAS I.
GILBERT IS.
ELLICE IS.
SANTA CRUZ IS.
NEW HEBRIDES
FIJI IS.
TONGA OR FRIENDLY IS.
SOCIETY IS.
TAHITI
MARQUESAS IS.
COOK IS.
NEW CALEDONIA
LOYALTY IS.
NORFOLK I.
BERMUDAS
CHATAM IS.
INDIAN OCEAN
PACIFIC OCEAN
TROPIC OF CAPRICORN
Cocos Is.
Palmerston
Cooktown
Broome
NORTHERN TERRITORY
WESTERN AUSTRALIA
SOUTH AUSTRALIA
QUEENSLAND
NEW SOUTH WALES
VICTORIA
Perth
Adelaide
Melbourne
Sydney
Brisbane
Auckland
NEW ZEALAND
Wellington
TASMANIA
Hobart
Torres Str.
Sunda Str.
Malacca Str.
Behring Str.
Yukon R.
Lena R.
Lena
Yakutsk
C. Chelyuskin
C. Deshnef
C. Prince of Wales
Tomea
Mackenzie R.
Dawson
DOMINION OF
Nome
Kodiak I.
Queen Charlotte Is.
Juan de Fuca Str.
Puget Sound
Columbia R.
Golden Gate
Honolulu
Manila
Singapore
Batavia
Sydney
Auckland
Wellington
Melbourne
Perth
Yokohama
Hongkong
Shanghai
Tokio
Vancouver
Seattle
San Francisco
Los Angeles
Panama Canal
Panama
Suez Canal
Suez
Gibraltar
Malta
Port Said
Aden
Bombay
Calcutta
Madras
Colombo
Penang
Hongkong
Manila
Yokohama



British Empire.

France and Possessions.

United States and Possessions.

Other Countries are shown in colors of lighter tints.

Principal Steamship Routes. The heavier lines show the chief ocean routes and are graded in size according to their relative importance.

Principal Railroads.

Submarine Cables.

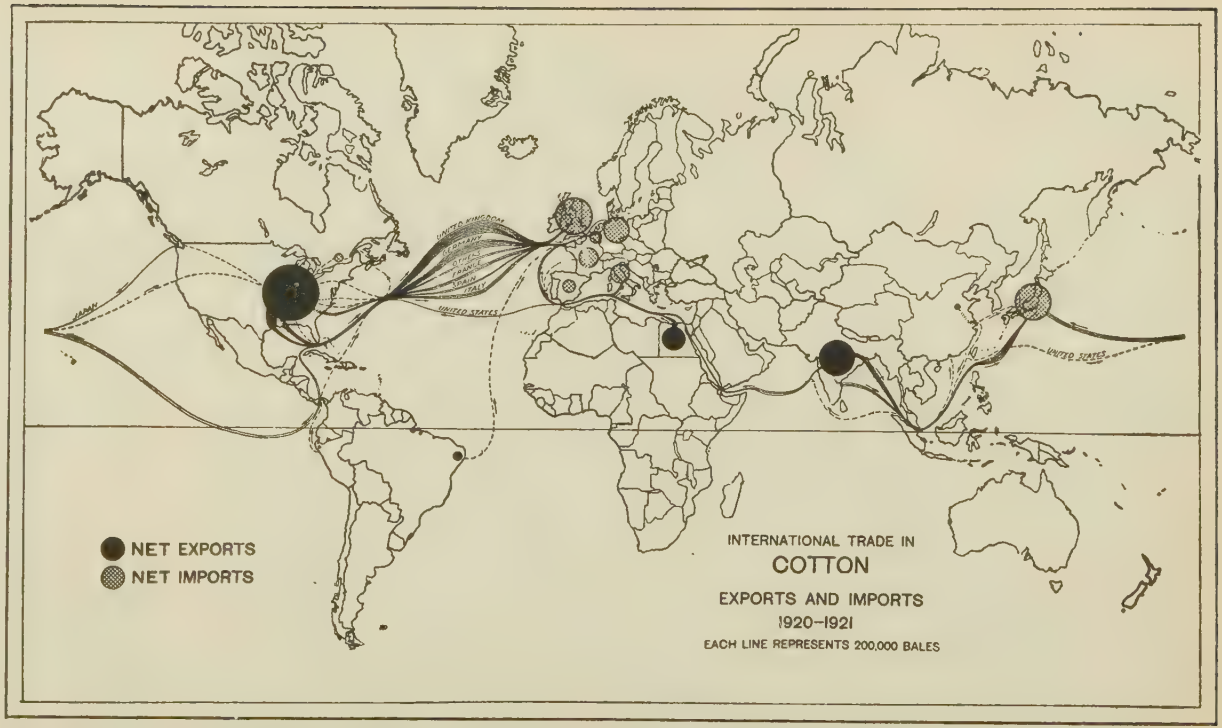


FIG. 367. International trade in cotton after the World War, showing surplus production, trade routes, and destination. Notice the use made of the Suez and Panama Canals. (*U. S. Dept. Agr.*)

Cotton. — After the invention of the cotton gin in 1793, cotton became the cheapest textile fiber for making clothing and it is now more extensively used for this purpose than all other fibers combined. While cotton is the main crop of Egypt, and is important in India and China, yet no other part of the world seems to be in all particulars so well adapted to its production as the southern United States, and more than half of the world's supply is grown there. The cotton plant bears the most cotton and the best cotton in the warm part of the temperate zone where there is ample summer rain, much sunshine, and about seven months without frost. A large supply of inexpensive labor is needed in the picking season. The United States, western Europe, and more recently Japan, are the chief cotton-manufacturing regions. Raw cotton is the largest single item of export from the United States and the largest item of import into Great Britain and Japan. Practically all the Egyptian cotton is exported, but the larger part of the crop grown in India and China is used in those countries, although Japan gets a part of her supply from them. Cotton and cotton goods form one of the foremost commodities of international trade, and cotton goods are one of the largest items in the manufactures of all the industrial countries, notably of Great Britain.

Wool. — In the extent of its use as a textile fiber, wool ranks next to cotton, yet the quantity of wool used in the world is less than one third that of cotton. Wool makes a warmer, more durable, and more expensive fabric, and is widely used for outer garments in cold regions. Sheep, with their thick, warm coats, are not raised in hot climates, though they are raised in highlands within the tropics, as in Mexico and India. Sheep are particularly well suited to semi-arid pasture lands and hill lands where crops can not be grown to advantage. Parts of Australia, Argentina, Uruguay, South Africa, the Balkan Peninsula, and the British Isles are regions with a large number of sheep to the square mile, while the United States and Russia raise them over large but scattered areas. Wool has a relatively high value, can be pressed into compact bales, can be stored and

shipped without deterioration, and consequently may be produced in remote parts of the world and shipped to the manufacturing countries. Great Britain, France, and the United States are the leaders in woolen manufactures. The first two countries export woolen goods in large amounts, but the United States uses at home most of the woolen goods manufactured there.

Silk. — Three countries produce over 95 per cent of the raw silk of the world; they are Japan, China, and Italy, with Japan far in the lead. As already explained, raw silk can be produced profitably only in countries of cheap labor. The United States and France are the leading silk-manufacturing countries, and the United States is the greatest user of silk goods. The silk and cotton trade between the United States and Japan illustrates well a general principle of the geographical distribution of labor; Japan has little land but many laborers, and this condition makes raw silk production an ideal occupation for the Japanese people. The leading market for silk goods is in the United States, where there are millions of people who can afford to buy silk. Designing and weaving the complex patterns and securing the beautiful color effects of the high-priced silks are skilled operations, and the weaving machinery is expensive. For these reasons countries like Japan, in the earlier stage of manufacturing, are not ready for silk manufacturing on a large scale. In years to come, Japan will in all probability develop this industry, in fact is already doing so. The growing of cotton requires a special type of climate and a good deal of land, and Japan has not the land; but it has the labor and the near-by market for cotton goods. Cotton manufacturing is relatively simple, and Japan, with her cheap labor and the great market of China for cotton goods at her door, can afford to import raw cotton even from the United States and manufacture it into goods for sale in the populous Orient.

Coarse Fibers. — Practically all the world's jute is grown in India, practically all of the sisal in Yucatan, and of the manila in the Philippines; these are the three outstanding coarse fibers of commerce. The amount used is enormous, reaching far into

the millions of tons annually. About 40 per cent of the value of all the exports from India is comprised in raw and manufactured jute. One of the two chief products of the Philippines is manila, and the leading vegetable export of Mexico is sisal. All are tropical products produced by inexpensive labor; the sisal is almost wholly used for binder twine, the manila mainly for rope, and the jute mainly for burlap and bagging.

Rubber. — Of the 14,000,000 automobiles in the world in 1923, more than 11,000,000 were in the United States. Upwards of 50,000,000 rubber tires a year are required. The rubber for these and all other rubber products is now coming very largely from the plantations in southeastern Asia and the near-by islands. The growth of the commerce in plantation rubber is one of the impressive facts of this generation, while wild rubber from Brazil and Africa has sunk to a place of minor importance. Since the British were the leaders in establishing rubber plantations, London became the rubber market of the world, and in 1914 we bought six times as much rubber from London as from the Straits Settlements. In 1920 we bought four times as much from the Straits Settlements as from London. This is another of the important changes in the currents of commerce that the World War brought. The United States uses considerably more than half of the world's rubber, and the city of Akron, Ohio, manufactures from 35 to 40 per cent of the rubber goods of the world.

As in the case of silk, raw rubber is produced in the Far East where cheap labor is abundant, but it is sold and used chiefly in the wealthy countries of Europe and in the United States. A considerable degree of prosperity has been brought to parts of the Orient by its sale of rubber, silk, and tea, diverting hundreds of millions of dollars of western gold in a steady stream from Europe and America to the Far East.

Coal. — Considering the bulkiness and weight of coal, it is surprising how far it is shipped. Great Britain is the only great exporter. It has already been pointed out that British ships bringing heavy cargoes to England, carry coal back to many distant parts of the world. Thus British sea traffic is given a

better balance, and freight rates on British imports are lowered. The United States has half the coal of the world and mines about as much as any three other countries, yet our exports are not great, and probably never will be. The only continental

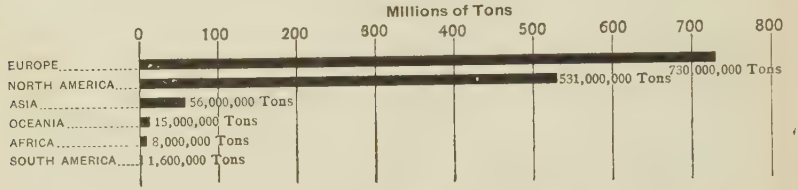


FIG. 368. The world's average annual production of coal. In 1918 the United States alone produced over 600,000,000 tons.

country that has exported much coal is Germany, and her exports have been negligible since the World War.

Petroleum. — Petroleum as a liquid fuel is one of the great sources of energy, and one of its products — gasoline — has made possible a type of engine that has revolutionized transportation on land and in the air. In recent years the United States has produced more than a million barrels of petroleum every day and supplied about 60 per cent of all that the world used. Mexico is another large producer, whose output rose with astonishing rapidity after 1915. The famous oil field near Baku on the Caspian Sea has been at low ebb since the Russian Revolution. It is believed that the region included in Mesopotamia and western Persia has great reserves of petroleum, and it is probable that in many other parts of the world petroleum will be found in large quantities. Mexico is the leading exporter of crude oil, and the United States of refined oil and other refined petroleum products. In recent years, this country has sold abroad about a million dollars' worth of petroleum products daily.

REGIONS OF INTERNATIONAL TRADE

Manufacturing Regions of the World. — Most of the manufactured goods that enter international trade are made in two parts of the world. The United States manufactures more goods

than any two other nations, but about 90 per cent of these goods are used within the country. Great Britain manufactures only half as many goods as the United States, but the two countries export about the same quantity. Germany was a great manufacturer and a great exporter of manufactures prior to the World War, and possibly will be again. The region of greatest manufacturing activity in Europe is included in a circle having a radius of 400 miles, with its center in Belgium. This circle touches Manchester in England, Milan in Italy, and Prague

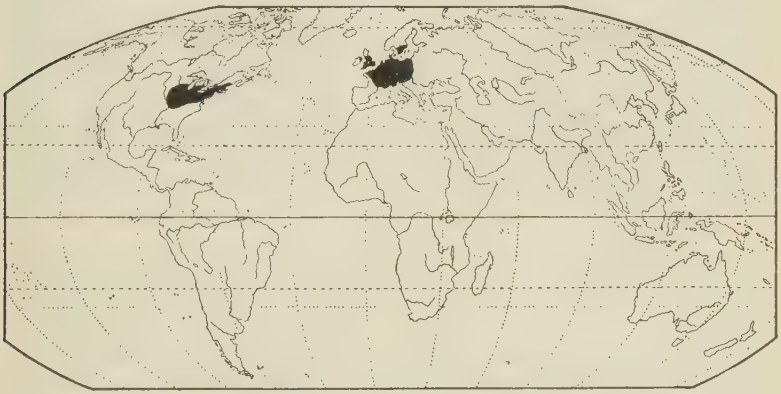


Fig. 369. In these small regions, about 90 per cent of the world's manufacturing is done.

in Czechoslovakia. It includes most of the distinctively manufacturing cities of Europe, but not all. This circle, with an area of about 500,000 square miles, is only one seventh the size of Europe. An area of half this extent but of different shape contains establishments that turn out 70 per cent of the manufactured goods made in the United States (Fig. 369). These two areas, which together make up less than 2 per cent of the land surface of the earth, supply about 90 per cent of all the manufactured goods that enter international commerce, the European region supplying about three or four times as much as the American region. The United States, Great Britain, Germany, and France make up the Big Four, and Belgium, Japan,

Italy, and Switzerland, the Little Four of the world's manufacturing nations.

The Great Commercial Ports of the World. — A relatively small number of ports, twenty or twenty-five in all, handle as much of the international trade of the world as all other ports combined. In nearly every country, one or two or three ports have risen to a dominating position in its foreign trade. These ports are (1) on good harbors open all the year, and (2) at the gateways of the principal producing or consuming regions, most commonly at the mouths of important rivers. By concentrating the overseas commerce of a country at one or two or three of the most favorably situated and best-equipped ports, lower freight rates often can be secured, for ships are able to obtain cargoes both ways, more frequent sailings are assured, and, in general, the needs of commerce are better served. In the United States, New York handles about as much of the foreign commerce as all other ports combined, and is almost if not quite the leading port of the world. The British Isles have upwards of forty good ports, yet about two thirds of their total foreign trade is handled by London and Liverpool. Antwerp in Belgium, Rotterdam in the Netherlands, and Hamburg in Germany are the three outstanding continental ports of northern Europe. Marseille at the southern entrance to the Rhone Valley is the chief port of France and of the Mediterranean. Buenos Aires controls more than half of the foreign trade of Argentina; but that of Brazil is divided between Rio de Janeiro and Santos.

The Orient has two free ports that collect and distribute a great deal of the commerce of the Eastern seas; they are the British ports of Hongkong and Singapore. Near the mouth of China's main river, the Yangtze, is Shanghai, the chief port of China. Japan has two major ports, Yokohama and Kobe; and India has two, Calcutta and Bombay.

The secondary ports of the United States are (1) for the Atlantic — Philadelphia, Boston, and Baltimore; (2) for the Gulf of Mexico — New Orleans and Galveston; (3) for the Pacific — San Francisco and Seattle. The chief port of Canada is Mont-

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FIG. 370. The Erie Basin on the Brooklyn shore of New York harbor.

© *Ewing Galloway*

FIG. 371. The Cleveland waterfront and railroad yards, which link with steamship traffic on the Great Lakes.

real, one of the few leading ports that are closed by ice for a part of the year.

The Great Sea Routes of Commerce. — There are three great steamship lanes on the high seas. The one along which the greatest amount of commerce moves is the one which joins western Europe and the United States (Fig. 366). The second connects Europe and the Far East by way of the Suez Canal, and the third reaches from Europe to eastern South America. There are many other routes, as shown in Figure 366. The Panama Canal routes are not yet so important as those of Suez. Those from our west coast to the Far East are rapidly growing in importance.

Whenever possible, ocean-going ships follow "great circle routes," for these are the shortest lines between two points on a sphere. A great circle is one which divides the earth's surface into two equal parts (hemispheres). For example, the shortest sea route between Liverpool and New York passes close to Nova Scotia and Newfoundland, and the shortest sea route between the Panama Canal and Japan passes near Alaska.

The Ocean Carriers. — The ocean commerce of the world is carried by *liners* and by *tramps*. The liners are steamships belonging to established lines; for example, the Cunard Line or the White Star Line. Line ships may carry only freight or they may also carry passengers, express, and mail. They sail on regular schedule between fixed ports, and sail on time whether fully laden or not. The tramps or charter ships as a rule carry nothing but bulk freight in an entire cargo of one kind, such as grain, coal, ore, lumber, or cotton. They are chartered (employed) for a single trip or for a definite period of time to go anywhere they may be sent, and they must assume the risk of securing a return cargo. Such a ship may go from port to port over the high seas and possibly may not return to the home port for years. They are cheaper to operate than liners, and carry their cargoes on the best terms that their brokers can secure for them, but their rates fluctuate with every voyage, depending upon the supply of freight at a given port and the number of ships ready

to compete for the cargo. The ship brokers are essential middlemen who find cargoes for ships and ships for cargoes; they bring shippers and carriers together. The tramps operate as single units, not in fleets, but the line vessels operate as parts of a fleet which may have not only a trunk route — say from New York to Liverpool — but also many branches and feeders somewhat like a railroad system. The great Hamburg-American Line in 1914 controlled over 400 ships which supplied seventy routes.

In addition to the liners and tramps, which are carriers of freight for anybody and everybody, a much smaller number of ships belong to companies that use them mainly for transporting their own products. For example, the Standard Oil Company owns many tank ships in which it transports oil, and the United Fruit Company carries most of its bananas in its own ships. Such companies are, however, relatively rare.

The Great Commercial Nations and the Growth of World Commerce. — Europe carries on the greatest commerce of all the continents, and North America ranks second. Before the World War only ten countries had a total foreign trade exceeding a billion dollars a year each; they were:

Great Britain	Belgium
The United States	Russia
Germany	Austria-Hungary
France	Italy
Netherlands	Canada

It will be noted that eight of the ten are European countries and that the other two are in North America.

In 1922 the leading ten commercial countries were the following, and their trade constituted fully three fourths of the international trade of the world.

The United States	Canada
Great Britain	Japan
France	Netherlands
Germany	Argentina
Italy	Belgium

The leading competitors are now Great Britain and the United States, the two great English-speaking nations, and their leadership is likely to continue for a long time, with the advantage on the side of the country of the greater resources.

The growth of the world's commerce has been extremely rapid; with occasional setbacks, it is likely to go on increasing, and the growth shown in the following table will probably seem small in centuries to come.

Growth of World Commerce

(*U. S. Statistical Abstract*, 1921)

Year	*Population*	*Total commerce*	*Per capita commerce*
1820	780,000,000	$1,659,000,000	$2.13
1830	847,000,000	1,981,000,000	2.34
1840	950,000,000	2,789,000,000	2.93
1850	1,075,000,000	4,049,000,000	3.76
1860	1,205,000,000	7,246,000,000	6.01
1870	1,310,000,000	10,663,000,000	8.14
1880	1,439,000,000	14,761,000,000	10.26
1890	1,488,000,000	17,519,000,000	11.80
1900	1,543,000,000	20,105,000,000	13.02
1906	1,579,000,000	27,418,000,000	17.36
1910	1,616,000,000	33,634,000,000	20.81
1911	1,630,000,000	35,909,000,000	21.71
1912	1,643,000,000	39,570,000,000	24.08
1913	1,652,000,000	40,420,000,000	24.47
1914	1,661,000,000	37,760,000,000	22.73
1915	1,672,000,000	31,302,000,000	18.72
1916	1,692,000,000	46,523,000,000	27.50
1917	1,693,000,000	52,781,000,000	31.18
1918	1,699,000,000	62,802,000,000	36.96
1919	1,701,000,000	75,311,000,000	44.28
1920	1,703,000,000	61,277,000,000	33.50

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TABLE 1. STATISTICS OF THE PRINCIPAL COUNTRIES — AREA, POPULATION, COMMERCE

(Chiefly from the Statistical Abstract of the U. S., 1922)

Country	Area, Sq. Miles	Population in 1922 or Latest Available Date	Commerce		
			Year	Total Imports	Total Exports
Argentina	1,136,137	8,699,000	1920	$846,016,000	$946,985,000
Australia	2,974,581	5,635,000	1921	608,927,000	449,757,000
Austria	32,395	6,423,000	1922	322,312,000	212,037,000
Belgium	11,373	7,466,000	1920	954,653,000	653,285,000
			1922	710,117,000[3]	467,431,000
Belgian Congo	913,127	15,000,000	1919	10,570,000	23,811,000
Bolivia	613,900[1]	2,890,000	1920	20,365,000	43,546,000
Brazil	3,145,550	30,636,000	1921	226,512,000	222,283,000
Bulgaria	39,825	4,861,000	1921	25,908,000	19,666,000
Canada	3,729,665	8,967,000	1923	795,428,000	924,745,000
Central Am. States:					
Costa Rica	18,691	485,000	1922	8,345,000	14,224,000
Guatemala	43,641	2,005,000	1921	13,616,000	12,116,000
Honduras	46,250	662,000	1921	16,723,000	5,429,000
Nicaragua	49,552	638,000	1921	5,310,000	7,081,000
Panama	32,380	434,000	1921	11,372,000	2,495,000
Salvador	13,176	1,526,000	1920	12,628,000	14,988,000
Chile	289,796	3,819,000	1921	106,187,000	123,927,000
China	4,278,352	431,480,000[2]	1922	799,236,000	536,815,000
Colombia	435,278	6,300,000	1919	41,713,000	75,820,000
Cuba	44,218	2,899,000	1920	434,189,000	855,138,000
			1921	356,435,000	278,131,000
Czechoslovakia	54,190	13,611,000	1921	282,435,000	343,853,000
Denmark	16,609	3,290,000	1921	302,143,000	251,019,000
Dominican Rep.	19,325	897,000	1922	14,317,000	14,875,000
Ecuador	118,627	2,000,000	1921	6,952,000	10,055,000
Egypt	347,840	13,551,000	1922	198,380,000	222,920,000
Sudan	1,014,600	5,850,000	1921	22,921,000	8,122,000
Esthonia	18,355	1,111,000			
Finland	149,639	3,403,000	1921	73,906,000	60,175,000
France	212,736	39,210,000	1922	1,938,031,000	1,673,243,000
Algeria	222,119	5,806,000	1921	133,581,000	101,874,000
Tunis	48,313	2,094,000	1921	53,839,000	50,198,000
French Indo-China	274,457	18,982,000	1922	68,831,000	91,192,000
Other French Col.	4,600,000	21,900,000	1921	87,498,000	69,348,000
Germany	182,264	59,856,000	1922	1,475,695,000	944,860,000
Greece	49,167	4,950,000	1922	85,116,000	65,563,000
Haiti	11,072	1,631,000	1922	12,350,000	10,712,000
Hungary	35,832	7,951,000	1921	91,114,000	47,202,000
India, British	1,802,577	318,942,000	1922	705,473,000	613,725,000
Irish Free State	27,040	3,140,000			
Italy	119,991	38,835,000	1920	1,803,366,000	887,213,000
			1922	751,033,000	443,536,000
Japan	147,698	57,656,000	1922	902,404,000	783,434,000
Taiwan	13,750	3,655,000	1921	64,633,000	73,552,000
Chosen	84,103	17,264,000	1921	112,124,000	105,319,000
Latvia	25,402	1,851,000	1921	13,505,000	5,607,000
Liberia	36,834	1,500,000	1921	1,232,000	820,000
Lithuania	25,000	2,300,000			
Mexico	767,260	14,463,000	1920	178,239,000	202,664,000
Morocco	221,163	6,000,000	1919	77,983,000	33,657,000
Netherlands	13,199	6,977,000	1920	1,146,988,000	585,636,000
			1922	780,482,000	470,590,000
Dutch East Indies	732,254	47,204,000	1921	363,041,000	400,041,000
New Zealand	103,581	1,266,000	1921	164,658,000	165,417,000
Norway	125,017	2,632,000	1921	218,215,000	90,246,000
Paraguay	97,722	1,000,000	1921	6,102,000	6,801,000
Persia	628,164	9,500,000	1922	53,821,000	44,442,000
Peru	533,912	7,300,000	1921	62,674,000	62,000,000

[1] Statesman's Year Book gives 514,155 sq. mi. as the area of Bolivia.
[2] Other estimates of the population of China are as low as 320,000,000.
[3] The commercial statistics for Luxemburg in 1922 are included in those for Belgium.

TABLE 1. STATISTICS OF THE PRINCIPAL COUNTRIES — AREA, POPULATION, COMMERCE — Continued

Country	Area, Sq. Miles	Population in 1922 or Latest Available Date	Commerce		
			Year	Total Imports	Total Exports
Poland	149,220	27,179,000			
Portugal	35,501	6,041,000	1919	$126,185,000	$58,840,000
Portuguese Colonies	937,772	8,743,000	1920	33,117,000	17,706,000
Rumania	113,608	17,393,000	1920	137,767,000	68,060,000
Russia	8,167,000	131,546,000	1922	134,934,000	38,586,000
Siam	194,568	9,322,000	1922	53,950,000	65,614,000
Spain	195,041	21,338,000	1920	226,619,000	161,019,000
Sweden	173,151	5,988,000	1921	285,258,000	247,194,000
Switzerland	15,945	3,886,000	1921	398,498,000	371,399,000
			1922	358,158,000	321,651,000
Turkey	282,144	10,000,000[4]	1921	97,064,000	24,304,000
Union of South Africa	473,100	6,929,000	1922	209,172,000	122,727,000
United Kingdom	94,398	44,122,000	1921	4,182,713,000	2,706,638,000
			1922	4,453,124,000	3,190,054,000
British Colonies[5]	2,206,404	45,780,000	1919	990,746,000	1,223,800,000
United States	3,689,287	109,482,000	1922	3,112,747,000	3,765,091,000
Philippines	115,026	10,906,000	1922	83,015,000	94,478,000
Porto Rico	3,435	1,347,000	1922	64,817,000	65,117,000
Uruguay	72,172	1,529,000	1922	64,932,000	61,713,000
Venezuela	393,976	2,412,000	1921	14,109,000	22,037,000
Yugoslavia	96,134	12,017,000	1921	97,663,000	58,302,000

[4] 1923 estimate.

[5] Not including India or the self-governing dominions of Australia, Canada, Irish Free State, New Zealand, and Union of South Africa, given in alphabetic order.

TABLE 2. COMMERCE OF THE GREAT PORTS

(In Millions of Dollars)

	Imports	Exports		Imports	Exports
Alexandria, Egypt ('19)	172	358	Kobe, Japan ('19)	506	221
Amsterdam, Holland ('20)	670	503	Liverpool, England ('19)	2,678	1,352
Antwerp, Belgium ('12)	623	588	London, England ('19)	2,731	1,259
Auckland, N. Zealand ('20)	90	45	Manchester, England ('19)	478	236
Baltimore, U. S. ('20)	70	382	Marseilles, France ('17)	824	1,111
Barcelona, Spain ('17)	130	66	Melbourne, Australia ('19)	170	132
Bombay, India ('19)	230	249	Montreal, Canada ('20)	247	349
Bordeaux, France ('17)	1,172	1,085	Naples, Italy ('16)	139	37
Boston, U. S. ('20)	393	193	New Orleans, U. S. ('20)	274	712
Bremen, Germany ('13)	371	211	New York, U. S. ('20)	2,894	3,285
Bristol, England ('19)	240	25	Norfolk, U. S. ('20)	15	317
Buenos Aires, Argt. ('19)	186	482	Osaka, Japan ('19)	84	219
Buffalo, U. S. ('20)	121	238	Philadelphia, U. S. ('20)	282	442
Calcutta, India ('19)	206	332	Portland, Oregon, U. S. ('20)	8	61
Callao, Peru ('19)	43	35	Rio de Janeiro, Brazil ('19)	165	102
Canton, China ('19)	42	88	San Francisco, U. S. ('20)	212	226
Cardiff, Wales ('19)	66	148	Santos, Brazil ('19)	109	314
Chicago, U. S. ('20)	65	26	Savannah, U. S. ('20)	54	202
Cleveland, U. S. ('20)	26	61	Seattle, U. S. ('20)	134	193
Constantinople, Turkey ('12)	74	29	Shanghai, China ('19)	356	353
Dairen, Manchuria ('19)	135	143	Singapore, Straits S. ('18)	424	420
Detroit, U. S. ('20)	107	356	Southampton, Eng. ('19)	152	48
Duluth, U. S. ('20)	37	51	Sydney, Australia ('19)	209	229
Dunkirk, France ('17)	154	25	Tampa, U. S. ('20)	21	126
Galveston, U. S. ('20)	31	650	Tampico, Mexico ('13)	23	40
Genoa, Italy ('16)	741	143	Tientsin, China ('19)	91	37
Glasgow, Scotland ('19)	312	244	Valparaiso, Chile ('18)	88	29
Havana, Cuba ('19)	233	90	Vera Cruz, Mexico ('13)	41	42
Hamburg, Germany ('13)	1,084	817	Wellington, N. Zealand ('20)	105	35
Havre, France ('17)	921	157	Yokohama, Japan ('19)	343	508
Hull, England ('19)	414	306			

TABLE 3. POPULATION OF LARGE FOREIGN CITIES

	Pop.	Year
Adelaide, Australia	261,000	('21)
Aleppo, Syria	140,000	
Alexandria, Egypt	445,000	('17)
Algiers, Algeria	207,000	('21)
Amsterdam, Netherlands	647,000	('20)
Antwerp, Belgium	304,000	('21)
Athens, Greece	293,000	('20)
Bagdad, Iraq	250,000	('20)
Bahia, Brazil	283,000	('20)
Baku, Azerbaijan	263,000	('21)
Bangkok, Siam	630,000	('20)
Barcelona, Spain	710,000	('20)
Batavia, Java	139,000	('20)
Belfast, Ireland	425,000	('22)
Benares, India	198,000	('21)
Berlin, Germany	3,804,000	('19)
Birmingham, England	919,000	('21)
Bologna, Italy	211,000	('21)
Bombay, India	1,174,000	('21)
Bordeaux, France	267,000	('21)
Bradford, England	286,000	('21)
Bremen, Germany	270,000	('19)
Breslau, Germany	528,000	('19)
Bristol, England	377,000	('21)
Brussels, Belgium	775,000	('21)
Bucharest, Roumania	309,000	('17)
Budapest, Hungary	1,185,000	('21)
Buenos Aires, Argentina	1,720,000	('22)
Cairo, Egypt	791,000	('17)
Calcutta, India	1,328,000	('21)
Canton, China	900,000	('21)
Cape Town, S. Africa	207,000	('21)
Catania, Italy	255,000	('21)
Chemnitz, Germany	304,000	('19)
Christiania, Norway	258,000	('20)
Cologne, Germany	634,000	('19)
Colombo, Ceylon	244,000	('21)
Constantinople, Turkey	1,000,000	
Copenhagen, Denmark	561,000	('16)
Danzig, Danzig	195,000	('23)
Delhi, India	304,000	('21)
Dortmund, Germany	295,000	('19)
Dresden, Germany	529,000	('19)
Dublin, Ireland	427,000	('22)
Dusseldorf, Germany	407,000	('19)
Edinburgh, Scotland	420,000	('21)
Essen, Germany	439,000	('19)
Florence, Italy	254,000	('21)
Frankfort-on-Main, Germany	433,000	('19)
Genoa, Italy	301,000	('21)
Glasgow, Scotland	1,034,000	('21)
Göteborg, Sweden	227,000	('22)
Hague, Netherlands	355,000	('19)
Hamburg, Germany	986,000	('19)
Hangchow, China	892,000	('21)
Hankow, China	1,468,000	('20)
Hanover, Germany	393,000	('19)
Harbin, Manchuria	156,000	('21)
Havana, Cuba	364,000	('20)
Havre, France	163,000	('21)
Helsingfors, Finland	198,000	('20)
Hull, England	287,000	('21)
Johannesburg, S. Africa	284,000	('21)
Kief, Russia	366,000	('21)
Kiel, Germany	205,000	('19)
Kobe, Japan	609,000	('20)
Konigsberg, Germany	261,000	('19)
Kyoto, Japan	591,000	('20)
Leeds, England	458,000	('21)
Leipzig, Germany	604,000	('19)
Lille, France	201,000	('21)
Lima, Peru	176,000	('20)
Lisbon, Portugal	490,000	('20)
Liverpool, England	803,000	('21)
Lodz, Poland	452,000	('21)
London, England	7,476,000	('21)
Lyon, France	562,000	('21)
Madras, India	527,000	('21)
Madrid, Spain	751,000	('20)
Magdeburg, Germany	286,000	('19)
Manchester, England	731,000	('21)
Mannheim, Germany	230,000	('19)
Marseille, France	586,000	('21)
Melbourne, Australia	795,000	('21)
Mexico, Mexico	1,080,000	('10)
Milan, Italy	718,000	('21)
Montevideo, Uruguay	351,000	('22)
Montreal, Canada	619,000	('21)
Moscow, Russia	1,028,000	('21)
Munich, Germany	631,000	('19)
Nagoya, Japan	430,000	('20)
Nanking, China	380,000	('21)
Nantes, France	184,000	('21)
Naples, Italy	780,000	('21)
Newcastle, England	275,000	('21)
Nottingham, England	263,000	('21)
Nuremberg, Germany	353,000	('19)
Odessa, Russia	432,000	('21)
Oporto, Portugal	203,000	('20)
Osaka, Japan	1,253,000	('20)
Ottawa, Canada	108,000	('21)
Palermo, Italy	400,000	('21)
Para, Brazil	236,000	('20)
Paris, France	2,906,000	('21)
Peking, China	1,300,000	('21)
Pernambuco, Brazil	239,000	('20)
Petrograd, Russia	706,000	('21)
Prague, Czechoslovakia	676,000	('21)
Riga, Latvia	185,000	('20)
Rio de Janeiro, Brazil	1,158,000	('20)
Rome, Italy	691,000	('21)
Rosario, Argentina	265,000	('22)
Rotterdam, Netherlands	516,000	('20)
Santiago, Chile	507,000	('20)
Sao Paulo, Brazil	579,000	('20)
Seoul, Chosen	250,000	('20)
Shanghai, China	1,500,000	('21)
Sheffield, England	491,000	('21)
Singapore, Straits Settlements	387,000	('19)
Stockholm, Sweden	422,000	('22)
Strasbourg, France	167,000	('21)
Stuttgart, Germany	309,000	('19)
Sydney, Australia	898,000	('21)
Tientsin, China	800,000	('21)
Tiflis, Georgia	347,000	('15)
Tokyo, Japan	2,173,000	('20)
Toronto, Canada	522,000	('21)
Tunis, Tunis	172,000	('21)
Turin, Italy	502,000	('21)
Valencia, Spain	244,000	('20)
Valparaiso, Chile	182,000	('20)
Vancouver, Canada	117,000	('21)
Venice, Italy	172,000	('21)
Victoria, Hongkong	360,000	('21)
Vienna, Austria	1,841,000	('20)
Warsaw, Poland	931,000	('21)
Yokohama, Japan	423,000	('20)
Zurich, Switzerland	207.000	('20)

TABLE 4. STATE AND TERRITORIAL STATISTICS

States, Etc.	Capitals	Largest Cities	Area in Sq. Miles	Population, 1920
Alabama	Montgomery	Birmingham	51,998	2,348,174
Arizona	Phoenix	Phoenix	113,956	334,162
Arkansas	Little Rock	Little Rock	53,335	1,752,204
California	Sacramento	Los Angeles	158,297	3,426,861
Colorado	Denver	Denver	103,948	939,629
Connecticut	Hartford	New Haven	4,965	1,380,631
Delaware	Dover	Wilmington	2,370	223,003
Florida	Tallahassee	Jacksonville	58,666	968,470
Georgia	Atlanta	Atlanta	59,265	2,895,832
Idaho	Boise	Boise	83,888	431,866
Illinois	Springfield	Chicago	56,665	6,485,280
Indiana	Indianapolis	Indianapolis	36,354	2,930,390
Iowa	Des Moines	Des Moines	56,147	2,404,021
Kansas	Topeka	Kansas City	82,158	1,769,257
Kentucky	Frankfort	Louisville	40,598	2,416,630
Louisiana	Baton Rouge	New Orleans	48,506	1,798,509
Maine	Augusta	Portland	33,040	768,014
Maryland	Annapolis	Baltimore	12,327	1,449,661
Massachusetts	Boston	Boston	8,266	3,852,356
Michigan	Lansing	Detroit	57,980	3,668,412
Minnesota	St. Paul	Minneapolis	84,682	2,387,125
Mississippi	Jackson	Meridian	46,865	1,790,618
Missouri	Jefferson City	St. Louis	69,420	3,404,055
Montana	Helena	Butte	146,997	548,889
Nebraska	Lincoln	Omaha	77,520	1,296,372
Nevada	Carson City	Reno	110,690	77,407
New Hampshire	Concord	Manchester	9,341	443,083
New Jersey	Trenton	Newark	8,224	3,155,900
New Mexico	Santa Fe	Albuquerque	122,634	360,350
New York	Albany	New York	49,204	10,385,227
North Carolina	Raleigh	Winston-Salem	52,426	2,559,123
North Dakota	Bismarck	Fargo	70,837	646,872
Ohio	Columbus	Cleveland	41,040	5,759,394
Oklahoma	Oklahoma City	Oklahoma City	70,057	2,028,283
Oregon	Salem	Portland	96,699	783,389
Pennsylvania	Harrisburg	Philadelphia	45,126	8,720,017
Rhode Island	Providence	Providence	1,248	604,397
South Carolina	Columbia	Charleston	30,989	1,683,724
South Dakota	Pierre	Sioux Falls	77,615	636,547
Tennessee	Nashville	Memphis	42,022	2,337,885
Texas	Austin	San Antonio	265,896	4,663,228
Utah	Salt Lake City	Salt Lake City	84,990	449,396
Vermont	Montpelier	Burlington	9,564	352,428
Virginia	Richmond	Richmond	42,627	2,309,187
Washington	Olympia	Seattle	69,127	1,356,621
West Virginia	Charleston	Wheeling	24,170	1,463,701
Wisconsin	Madison	Milwaukee	56,066	2,632,067
Wyoming	Cheyenne	Cheyenne	97,914	194,402
Territories, etc.				
Alaska	Juneau	Fairbanks	590,884	55,036
Dist. of Columbia	Washington	Washington	70	437,571
Hawaii	Honolulu	Honolulu	6,449	255,912
Porto Rico	San Juan	San Juan	3,435	1,299,809
			3,689,287	107,321,377
Philippine Islands	Manila	Manila	115,026	10,350,640
Tutuila, etc	Pago Pago	Leone	77	8,056
Guam	Agaña		210	13,275
Canal Zone			527	22,858
Virgin Islands of U. S.	St. Thomas	St. Thomas	132	26,051
In U. S. Service abroad				117,238
United States	Washington	New York	3,805,259	117,859,495

TABLE 5. STATE STATISTICS — VALUE OF FARM PROPERTY, CROPS, MANUFACTURES, AND MINERALS

State	Value of Farm Property, 1920	Value of All Crops, 1919	Value of Manufactures, 1919	Value of Mineral Pr'd's, 1920
Alabama	$670,848,000	$304,349,000	$492,731,000	$86,289,000
Arizona	233,592,000	42,481,000	120,769,000	116,383,000
Arkansas	924,395,000	340,813,000	200,813,000	17,813,000
California	3,431,021,000	589,757,000	1,981,205,000	269,404,000
Colorado	1,076,794,000	181,065,000	275,622,000	76,037,000
Connecticut	226,991,000	44,473,000	1,392,432,000	6,326,000
Delaware	80,137,000	23,059,000	165,073,000	359,000
Florida	330,301,000	80,257,000	213,327,000	22,923,000
Georgia	1,356,685,000	540,614,000	693,237,000	12,178,000
Idaho	716,137,000	126,495,000	80,511,000	32,449,000
Illinois	6,666,767,000	864,738,000	5,425,245,000	373,926,000
Indiana	3,042,311,000	497,230,000	1,939,753,000	146,736,000
Iowa	8,524,870,000	890,391,000	745,473,000	57,250,000
Kansas	3,302,806,000	588,923,000	913,667,000	198,097,000
Kentucky	1,511,901,000	347,339,000	395,660,000	195,920,000
Louisiana	589,826,000	206,182,000	676,190,000	138,745,000
Maine	270,526,000	100,152,000	456,822,000	5,428,000
Maryland	463,638,000	110,166,000	873,945,000	30,944,000
Massachusetts	300,471,000	53,701,000	4,011,182,000	12,411,000
Michigan	1,763,334,000	404,015,000	3,466,188,000	166,338,000
Minnesota	3,787,420,000	506,020,000	1,218,130,000	177,589,000
Mississippi	964,751,000	336,207,000	197,747,000	2,201,000
Missouri	3,591,068,000	559,048,000	1,594,208,000	90,994,000
Montana	985,961,000	69,975,000	166,665,000	85,885,000
Nebraska	4,201,655,000	519,730,000	596,042,000	7,168,000
Nevada	99,779,000	13,980,000	22,874,000	25,648,000
New Hampshire	118,656,000	23,510,000	407,205,000	2,986,000
New Jersey	311,847,000	87,484,000	3,672,665,000	72,335,000
New Mexico	325,185,000	40,620,000	17,857,000	27,883,000
New York	1,908,483,000	417,047,000	8,867,005,000	78,431,000
North Carolina	1,250,166,000	503,229,000	643,808,000	7,760,000
North Dakota	1,759,742,000	301,783,000	57,374,000	3,078,000
Ohio	3,095,666,000	607,038,000	5,100,309,000	355,844,000
Oklahoma	1,660,423,000	550,085,000	401,363,000	493,320,000
Oregon	818,559,000	131,885,000	366,783,000	5,496,000
Pennsylvania	1,729,353,000	409,969,000	7,315,703,000	1,314,332,000
Rhode Island	33,636,000	5,340,000	747,323,000	1,175,000
South Carolina	953,064,000	437,122,000	381,453,000	2,825,000
South Dakota	2,823,870,000	311,007,000	62,171,000	5,950,000
Tennessee	1,251,964,000	318,285,000	556,253,000	55,023,000
Texas	4,477,420,000	1,071,542,000	999,996,000	371,250,000
Utah	311,274,000	58,067,000	156,935,000	76,536,000
Vermont	222,736,000	48,000,000	168,108,000	15,008,000
Virginia	1,196,555,000	292,824,000	643,512,000	60,161,000
Washington	1,057,429,000	227,212,000	809,623,000	26,677,000
West Virginia	496,439,000	96,537,000	471,971,000	547,872,000
Wisconsin	2,677,282,000	445,348,000	1,846,984,000	19,630,000
Wyoming	334,410,000	30,271,000	81,445,000	84,034,000
Total	77,924,100,000	14,255,365,000	62,418,078 000	6,951,410,000

TABLE 6. POPULATION OF LARGE CITIES OF THE UNITED STATES

	1920	1910	1900	1880	1860
New York	5,620,048	4,766,883	3,437,202	1,911,698	1,174,779
Chicago	2,701,705	2,185,283	1,698,575	503,185	109,260
Philadelphia	1,823,779	1,549,008	1,293,697	847,170	565,529
Detroit	993,678	465,766	285,704	116,340	45,619
Cleveland	796,841	560,663	381,768	160,146	43,417
St. Louis	772,897	687,029	575,238	350,518	160,773
Boston	748,060	670,585	560,892	362,839	177,840
Baltimore	733,826	558,485	508,957	332,313	212,418
Pittsburgh	588,343	533,905	451,512	235,071	77,923
Los Angeles	576,673	319,198	102,479	11,183	4,385
Buffalo	506,775	423,715	352,387	155,134	81,129
San Francisco	506,676	416,912	342,782	233,050	56,802
Milwaukee	457,147	373,857	285,315	115,587	45,246
Washington, D. C	437,571	331,069	278,718	177,624	75,080
Newark	414,524	347,469	246,070	136,508	7,941
Cincinnati	401,247	363,591	325,902	255,139	161,044
New Orleans	387,219	339,075	287,104	216,090	168,675
Minneapolis	380,582	301,408	202,718	46,887	2,564
Kansas City, Mo	324,410	248,381	163,752	55,785	4,418
Seattle	315,312	237,194	80,671	3,533	.....
Indianapolis	314,194	233,650	169,164	75,056	18,611
Jersey City	298,103	267,779	206,433	120,722	29,226
Rochester, N. Y	295,750	218,149	162,608	89,366	48,204
Portland, Ore	258,288	207,214	90,426	17,577	2,874
Denver	256,491	213,381	133,859	35,629	.....
Toledo	243,164	168,497	131,822	50,137	13,768
Providence, R. I	237,595	224,326	175,597	104,857	50,666
Columbus, Ohio	237,031	181,511	125,560	51,647	18,554
Louisville	234,891	223,928	204,731	123,758	68,033
St. Paul	234,698	214,744	163,065	41,473	10,401
Oakland, Calif	216,261	150,174	66,960	34,555	1,543
Akron, Ohio	208,435	69,067	42,728	16,512	3,477
Atlanta, Ga	200,616	154,839	89,872	37,409	9,554
Omaha, Nebr	191,601	124,096	102,555	30,518	1,883
Worcester, Mass	179,754	145,986	118,421	58,291	24,960
Birmingham, Ala	178,806	132,685	38,415	3,086	.....
Syracuse, N. Y	171,717	137,249	108,374	51,792	28,119
Richmond, Va	171,667	127,628	85,050	63,600	37,910
New Haven, Conn	162,537	133,605	108,027	.....	.....
Memphis, Tenn	162,351	131,105	102,320	33,592	22,623
San Antonio, Tex	161,379	96,614	53,321	20,550	8,235
Dallas, Tex	158,976	92,104	42,638	10,358	.....
Dayton, Ohio	152,559	116,577	85,333	38,678	20,081
Bridgeport, Conn	143,355	102,054	70,996	27,643	.....
Houston, Tex	138,276	78,800	44,633	16,513	4,845
Hartford, Conn	138,036	98,915	79,850	42,015	.....
Scranton, Pa	137,783	129,867	102,026	45,850	9,223
Grand Rapids, Mich	137,634	112,571	87,565	32,016	8,085
Paterson, N. J	135,875	125,600	105,171	51,031	19,586
Youngstown, Ohio	132,358	79,066	44,885	15,435	2,759
Springfield, Mass	129,614	88,926	62,059	33,340	15,199
Des Moines, Iowa	126,468	86,368	62,139	22,408	3,965
New Bedford, Mass	121,217	96,652	62,442	26,845	22,300
Fall River, Mass	120,485	119,295	104,863	48,961	14,026
Trenton, N. J	119,289	96,815	73,307	29,910	17,228
Nashville, Tenn	118,342	110,364	80,865	43,350	16,988
Salt Lake City, Utah	118,110	92,777	53,531	20,768	8,236
Camden, N. J	116,309	94,538	75,935	41,659	14,358
Norfolk, Va	115,777	67,452	46,624	21,966	14,620
Albany, N. Y	113,344	100,253	94,152	90,758	62,367
Lowell, Mass	112,759	106,294	94,969	59,475	36,827
Wilmington, Del	110,108	87,411	76,508	42,478	21,258
Cambridge, Mass	109,694	104,839	91,886	52,669	26,060
Reading, Pa	107,784	96,071	78,961	43,278	23,162
Fort Worth, Tex	106,482	73,312	26,688	6,663	.....
Spokane, Wash	104,437	104,402	36,848	.....	.....
Kansas City, Kan	101,177	82,331	51,418	3,200	.....
Yonkers, N. Y	100,176	79,803	47,931	18,892	.....

TABLE 7. IMPORTS AND EXPORTS OF TWENTY COUNTRIES FOR THE CALENDAR YEARS 1913, 1920, AND 1921

(U. S. Department of Commerce)

Countries	Imports			Exports			Total Foreign Trade		
	1913	1920	1921	1913	1920	1921	1913	1920	1921
	Thousands of dollars	*Thousands of dollars*	*Thousands of dollars*	*Thousands of dollars*	*Thousands of dollars*	*Thousands of dollars*	*Thousands of dollars*	*Thousands of dollars*	*Thousands of dollars*
United States	1,792,596	5,278,481	2,509,148	2,484,018	8,228,016	4,485,031	4,276,614	13,506,497	6,994,179
Canada	659,904	1,193,550	715,972	460,519	1,163,092	731,390	1,120,423	2,356,642	1,447,362
Argentina	478,859	774,612	463,550	500,986	913,389	490,560	979,845	1,688,001	954,110
Brazil	326,865	470,664	221,627	318,518	394,520	224,235	645,383	865,184	445,862
Uruguay	52,076	79,531	65,203	70,839	74,119	48,050	122,915	153,650	113,253
Belgium	894,865	954,653	748,440	701,475	653,285	531,639	1,596,340	1,607,938	1,280,079
Denmark	229,234	511,706	290,978	193,306	309,495	264,198	422,540	821,201	555,176
Finland	95,619	139,982	77,392	78,126	112,960	73,130	173,745	252,942	150,522
France	1,625,317	3,513,305	1,755,633	1,327,882	1,893,404	1,606,870	2,953,199	5,406,709	3,362,503
Germany	2,563,185	1,708,722	1,062,684	2,403,142	1,206,902	858,292	4,966,327	2,915,624	1,920,976
Netherlands	1,568,917	1,146,988	753,767	1,232,303	585,636	460,829	2,801,220	1,732,624	1,214,596
Sweden	226,872	679,194	285,406	219,049	466,914	247,322	445,921	1,146,108	532,728
Switzerland	358,887	710,117	390,026	264,659	553,439	305,959	623,546	1,263,556	695,985
United Kingdom	3,741,048	7,081,747	4,182,713	3,089,353	5,706,084	3,118,686	6,830,401	12,787,831	7,301,399
British India	584,465	1,256,369	729,673	797,116	1,134,559	590,669	1,381,581	2,390,928	1,320,342
Japan	363,622	1,176,685	778,805	315,281	981,367	604,475	678,903	2,158,052	1,383,280
Australia	380,541	546,217	463,714	360,387	495,185	476,178	740,928	1,041,402	939,892
New Zealand	105,372	227,270	165,379	103,570	167,759	170,819	208,942	395,029	336,198
Egypt	137,551	380,009	218,867	158,620	330,646	167,682	296,171	710,655	386,549
Union of South Africa	187,471	342,261	191,984	140,977	175,829	107,046	328,448	518,090	299,030
Total (20 countries)	16,373,266	28,172,063	16,070,961	15,220,126	25,546,600	15,563,060	31,593,392	53,718,663	31,634,021

Note. Each number in this table represents thousands of dollars. In other words, 000 should be added to each number when it is read. For example, the imports of the United States in 1913 were $1,792,596,000.

TABLE 8. IMPORTS AND EXPORTS OF THE UNITED STATES BY CONTINENTS

Fiscal Year Ending June 30—	Europe				North America				South America				Asia			
	Imports		Exports		Imports		Exports		Imports		Exports		Imports		Exports	
	Millions of dollars	Per cent of total	Millions of dollars	Per cent of total	Millions of dollars	Per cent of total	Millions of dollars	Per cent of total	Millions of dollars	Per cent of total	Millions of dollars	Per cent of total	Millions of dollars	Per cent of total	Millions of dollars	Per cent of total
1910	806	51.8	1,136	65.1	307	19.7	386	22.1	196	12.6	93	5.3	193	12.5	61	3.5
1911	768	50.3	1,308	63.8	305	20.0	457	22.3	183	12.0	109	5.3	213	14.0	85	4.2
1912	820	49.6	1,342	60.9	334	20.2	517	23.5	215	13.0	132	6.0	225	13.6	117	5.3
1913	893	49.3	1,479	60.0	362	20.0	617	25.0	218	12.0	146	5.9	276	15.3	115	4.7
1914	896	47.3	1,486	62.9	427	22.6	529	22.4	223	11.8	125	5.3	287	15.2	113	4.8
1915	614	36.7	1,971	71.2	473	28.3	477	17.2	261	15.6	99	3.6	248	14.8	114	4.1
1916	616	28.0	2,999	69.2	592	26.9	733	16.9	392	17.8	180	4.2	437	19.9	279	6.4
1917	610	23.0	4,324	68.8	766	28.8	1,164	18.5	542	20.4	259	4.1	615	23.1	380	6.1
1918	412	14.0	3,732	63.0	918	31.2	1,236	20.9	567	19.3	315	5.3	826	28.1	447	7.6
1919	373	12.0	4,645	64.2	1,053	34.0	1,288	17.8	568	18.3	401	5.5	831	26.8	605	8.4
1920	1,179	22.5	4,864	60.0	1,486	28.4	1,634	20.2	861	16.4	491	6.1	1,369	26.1	798	9.8
1921	938	25.7	3,408	52.3	1,207	33.0	1,646	25.3	485	13.3	523	8.0	815	22.3	547	8.4
1922	830	31.8	2,067	54.8	701	26.9	897	23.8	289	11.1	191	5.1	645	24.7	442	11.7

Fiscal Year Ending June 30—	Oceania				Africa				Total	
	Imports		Exports		Imports		Exports		Imports, in millions of dollars	Exports, in millions of dollars
	Millions of dollars	Per cent of total	Millions of dollars	Per cent of total	Millions of dollars	Per cent of total	Millions of dollars	Per cent of total		
1910	37	2.4	51	2.9	17	1.1	19	1.1	1,557	1,745
1911	30	2.0	66	3.2	27	1.8	24	1.2	1,527	2,049
1912	36	2.2	72	3.3	23	1.4	24	1.1	1,653	2,204
1913	38	2.1	79	3.2	26	1.5	29	1.2	1,813	2,466
1914	42	2.2	84	3.5	19	1.0	28	1.2	1,894	2,365
1915	53	3.1	78	2.8	25	1.5	29	1.0	1,674	2,769
1916	96	4.4	99	2.3	65	3.0	44	1.0	2,198	4,333
1917	65	2.5	109	1.7	60	2.3	53	.8	2,659	6,290
1918	146	5.0	135	2.3	76	2.6	54	.9	2,946	5,920
1919	190	6.1	209	2.9	81	2.6	85	1.2	3,096	7,232
1920	158	3.0	193	2.4	185	3.5	129	1.6	5,238	8,109
1921	153	4.2	257	3.9	55	1.5	134	2.1	3,654	6,516
1922	91	3.5	123	3.3	52	2.0	52	1.4	2,608	3,771

TABLE 9. FOREIGN TRADE OF THE UNITED STATES IN 1920 BY COUNTRIES

Countries	Imports of U. S.	Exports of U. S	Total Trade
Austria	$1,792,418	$19,237,495	$21,029,913
Azores and Madeira Islands	2,615,094	1,183,084	3,798,178
Belgium	47,443,156	282,479,776	329,922,932
Bulgaria	5,899,383	1,785,181	7,684,564
Czechoslovakia	10,159,776	7,077,579	17,237,355
Denmark	20,575,146	85,074,449	105,649,595
Finland	5,189,887	18,745,260	23,935,147
France	165,654,703	676,193,257	841,847,960
Germany	88,836,280	311,437,377	400,273,657
Gibraltar	417,303	17,610,938	18,028,241
Greece	20,144,612	39,462,042	59,606,654
Hungary	185,504	1,487,242	1,672,746
Iceland and Faroe Islands	946,196	1,310,782	2,256,978
Italy	75,356,779	371,762,274	447,119,053
Jugoslavia, Albania, and Fiume	73,597	972,041	1,045,638
Malta, Gozo, etc	83,620	1,315,400	1,399,020
Netherlands	95,233,476	246,151,597	341,385,073
Norway	21,627,230	94,661,767	116,288,997
Poland and Danzig	739,114	69,929,171	70,668,285
Portugal	9,323,165	24,426,592	33,749,757
Rumania	22,311	11,093,037	11,115,348
Russia in Europe	1,825,390	15,446,832	17,272,222
Spain	42,513,051	151,440,032	193,953,083
Sweden	31,612,153	114,780,361	146,392,514
Switzerland	54,556,098	44,909,719	99,465,817
Turkey in Europe	11,176,999	31,330,913	42,507,912
United Kingdom:			
England	435,582,247	1,673,954,263	2,109,536,510
Scotland	40,058,193	108,766,672	148,824,865
Ireland	38,206,364	42,309,012	80,515,376
Bermuda	1,568,841	4,143,056	5,711,897
British Honduras	3,685,056	3,414,387	7,099,443
Canada	611,863,170	971,852,474	1,583,715,644
Costa Rica	10,133,282	9,887,108	20,020,390
Guatemala	20,076,519	10,202,620	30,279,139
Honduras	8,306,364	15,361,919	23,668,283
Nicaragua	7,971,426	9,542,964	17,514,390
Panama	8,272,586	33,333,155	41,605,741
Salvador	11,915,320	8,148,018	20,063,338
Greenland	210,000	20,302	230,302
Mexico	179,331,755	207,859,197	387,190,952
Miquelon, etc	.....	222,035	222,035
Newfoundland and Labrador	2,545,234	12,723,025	15,268,259
West Indies:			
British—			
Barbados	2,266,577	4,740,661	7,007,238
Jamaica	7,299,615	18,447,679	25,747,294
Trinidad and Tobago	9,292,980	13,592,622	22,885,602
Other British	4,243,017	9,656,342	13,899,359
Cuba	721,693,880	515,206,549	1,236,900,429
Dominican Republic	33,878,099	45,528,750	79,406,849
Dutch	4,431,950	3,544,468	7,976,418
French	163,480	7,958,820	8,122,300
Haiti	8,973,534	19,900,380	28,873,914
Virgin Islands	4,540,386	3,993,478	8,533,864
Argentina	207,776,868	213,725,984	421,502,852
Bolivia	10,495,298	4,573,381	15,068,679
Brazil	227,587,594	156,740,365	384,327,959
Chile	120,515,599	55,309,565	175,825,164
Colombia	53,644,022	59,142,277	112,786,299
Ecuador	14,479,903	12,244,129	26,724,032
Falkland Islands	.....	20,592	20,592
Guiana:			
British	4,817,126	6,991,987	11,809,113
Dutch	580,229	2,393,142	2,973,371
French	76,767	1,044,396	1,121,163
Paraguay	1,179,992	1,813,798	2,993,790
Peru	63,730,964	47,036,428	110,767,392

TABLE 9. FOREIGN TRADE OF THE UNITED STATES IN 1920 BY COUNTRIES — Continued

Countries	Imports of U. S.	Exports of U. S.	Total Trade
Uruguay	$33,780,647	$33,720,550	$67,501,197
Venezuela	22,388,862	29,204,396	51,593,258
Aden	4,280,609	1,750,469	6,031,078
China	192,705,982	145,737,321	338,443,303
Kwantung, leased territory	11,516,153	7,138,720	18,654,873
Chosen	114,384	2,929,125	3,309,509
East Indies:			
British—			
British India	176,073,650	99,857,517	275,931,167
Straits Settlements	191,778,691	18,984,578	210,763,269
Other British	33,186,388	3,168,073	36,354,461
Dutch	167,415,935	59,078,192	226,494,127
French Indo-China	2,555,903	2,558,127	5,114,030
Portuguese	.....	8,986	8,986
Hongkong	45,859,517	25,907 033	71,766,550
Japan	414,579,201	377,961,926	792,541,127
Persia	3,932,600	749,722	4,682,322
Russia in Asia	10,655,196	13,280,886	23,936,082
Siam	453,301	1 593,158	2,046,459
Turkey in Asia	28,589,937	10,916,885	39,506,822
Other Asia	31,830	282,859	314,689
Oceania:			
British—			
Australia	45,982,498	119,912,558	165,895,056
New Zealand	25,568,389	48,754,264	74,322,653
Other British	3,368,423	1,007,428	4,375,851
French	3,169,678	1,587,422	4,757,100
Philippine Islands	112,951,409	99,829,994	212,781,403
Other	1,925,471	349,883	2,275,354
Abyssinia	336	41,844	42,180
Belgian Congo	254,249	947,373	1,201,622
British Africa:			
West	6,886,881	17,199,944	34,086,825
South	20,616,766	60,939,159	81,555,925
East	6,639,588	2,700,192	9,339,780
Canary Islands	205,650	3,159,499	3,365,149
Egypt	97,015,056	38,121,645	135,136,701
French Africa	3,470,258	28,079,168	31,549,426
Italian Africa	429,717	405,456	835,173
Cameroon, etc	65,307	967,407	1,032,714
Liberia	16,258	288,254	304,512
Madagascar	2,059,406	446,597	2,506,003
Morocco	865,023	5,085,985	5,951,008
Portuguese Africa	1,760,582	7,183,221	8,943,803
Spanish Africa	117	96,027	96,144
Total	5,279,398,211	8,228,759,748	13,508,157,959

TABLE 10. PRINCIPAL DOMESTIC COMMODITIES EXPORTED FROM THE UNITED STATES

(U. S. Trade Information Bulletin 59)

Commodities	Total, Fiscal Year 1922	Per Cent of Total Value of Exports
Animals and animal products (total)	$429,907,000	11.62
Meats	131,953,000	3.54
Dairy products	36,375,000	.98
Fish	16,846,000	.45
Lard and neutral lard	97,428,000	2.63
Oleo oil	12,367,000	.33
Leather	41,245,000	1.15
Leather manufactures	17,648,000	.48
Furs and manufactures of	24,014,000	.65

TABLE 10. PRINCIPAL DOMESTIC COMMODITIES EXPORTED FROM THE UNITED STATES — Continued

Commodities	Total, Fiscal Year 1922	Per Cent of Total Value of Exports
Vegetable food products, oil seeds, expressed oils (total)	$812,824,000	21.97
Corn	115,862,000	3.13
Wheat—Grain	279,656,000	7.56
Flour	97,386,000	2.63
Other grains and preparations of	98,391,000	2.66
Oil cake and oil-cake meal	22,771,000	.62
Fruits and nuts—		
Canned fruits	16,368,000	.44
Other fruits and nuts	50,260,000	1.36
Sugar	77,447,000	2.09
Other vegetable products (total)	251,501,000	6.80
Rubber manufactures	31,024,000	.84
Naval stores, gums, and resins	15,232,000	.41
Leaf tobacco	156,729,000	4.24
Manufactures of tobacco	23,563,000	.64
Textiles (total)	764,268,000	20.66
Cotton, unmanufactured	596,379,000	16.12
Cotton cloth	76,935,000	2.08
Cotton wearing apparel	18,528,000	.50
Other manufactures of cotton	27,475,000	.74
Wood and paper (total)	130,045,000	3.51
Boards, planks, and scantlings	52,677,000	1.42
Other wood and manufactures of	36,437,000	.98
Paper, except printed matter	20,669,000	.56
Books, maps, and other printed matter	17,328,000	.47
Nonmetallic minerals (total)	471,156,000	12.73
Anthracite coal	32,201,000	.87
Bituminous coal	67,915,000	1.84
Petroleum, crude	16,366,000	.44
Gasoline, naphtha, and other light products	117,630,000	3.18
Illuminating oil	76,389,000	2.06
Gas and fuel oil	32,099,000	.87
Lubricating oil	78,110,000	2.11
Ores, metals, and manufactures of, except machinery and vehicles (total)	312,358,000	8.44
Iron and steel plates, sheets, skelp, and strips	49,078,000	1.33
Railway-track material — Rails	10,306,000	.28
Tubular products and fittings	21,297,000	.58
Wire and manufactures of	13,438,000	.36
Other iron and steel manufactures of	78,183,000	2.11
Refined copper in ingots, bars, or other forms	88,782,000	2.40
Other copper and manufactures of	12,370,000	.33
Machinery and vehicles (total)	345,725,000	9.34
Locomotives	18,134,000	.49
Electrical machinery and apparatus	57,153,000	1.54
Textile machinery	17,469,000	.47
Agricultural machinery and implements	19,056,000	.52
Automobiles, including chassis	42,899,000	1.16
Other vehicles	56,849,000	1.54
Chemicals and allied products (total)	100,519,000	2.72
Chemicals	50,260,000	1.36
Fertilizers and fertilizer materials	17,003,000	.46
Miscellaneous (total)	81,564,000	2.21
Total value of domestic merchandise	3,699,867,000	100.00

TABLE 11. PRINCIPAL COMMODITIES IMPORTED INTO THE UNITED STATES

(U. S. Trade Information Bulletin 59)

Commodities	Total, Fiscal Year July 1, 1921, to June 30, 1922	Per Cent of Total Value of Imports
Silk, unmanufactured	$307,283,000	11.78
Sugar, cane	200,773,000	7.70
Coffee, crude	148,503,000	5.70
Wood and manufactures of	127,737,000	4.90
Chemicals, drugs, dyes, and medicines	97,481,000	3.74
Fruits and nuts	89,865,000	3.45
India rubber and similar gums, crude	88,839,000	3.41
Cotton, manufactures of	88,196,000	3.38
Fibers, etc., manufactures of	87,229,000	3.34
Mineral oils	85,801,000	3.29
Paper	85,121,000	3.26
Hides and skins (except fur skins)	78,899,000	3.03
Tobacco and manufactures of	63,249,000	2.42
Articles, the growth, etc., of the United States, returned	61,552,000	2.36
Vegetable oils	52,928,000	2.03
Furs and fur skins, undressed	48,692,000	1.87
Precious stones	47,232,000	1.81
Wool, unmanufactured	45,649,000	1.75
Copper and manufactures of	45,018,000	1.73
Cotton, unmanufactured	43,958,000	1.68
Wool, manufactures of	43,333,000	1.66
Silk, manufactures of	40,338,000	1.55
Seeds	39,896,000	1.53
Meat and dairy products	32,443,000	1.24
Iron and steel and manufactures	29,661,000	1.14
Fish	29,368,000	1.13
Tin, bars, blocks, etc	28,980,000	1.11
Breadstuffs	28,366,000	1.09
Fibers and textile grasses, unmanufactured	27,831,000	1.07
Cocoa, crude	27,349,000	.99

TABLE 12. MANUFACTURED GOODS OF THE UNITED STATES

(whose total value in 1919 approximated or exceeded a billion dollars)

Automobiles	$2,387,903,000
Boots and shoes (not rubber)	1,155,041,000
Bakery products	1,151,896,000
Cars and repairs	1,835,900,000
Clothing, men's	1,162,985,000
Clothing, women's	1,208,543,000
Cotton goods	2,125,262,000
Electrical machinery and apparatus	997,968,000
Flour and grist-mill products	2,052,434,000
Foundry and machine shop products	2,289,250,000
Iron and steel works and rolling mills	2,828,902,000
Leather	928,591,000
Lumber and timber products	1,387,471,000
Petroleum refinining	1,632,532,000
Printing and publishing	1,521,816,000
Rubber goods	1,104,005,000
Shipbuilding, steel	1,456,486,000
Slaughtering and meat packing	4,246,290,000
Woolen and worsted goods	1,065,434,000
Total of manufactures in 1914	24,246,434,000
Total of manufactures in 1919 [1]	62,418,078,000

[1] Prices for the same goods were much higher in 1919 than in 1914.

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